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**AGRICULTURE**

**No. 109**



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6 November 1980

CHINA REPORT  
AGRICULTURE

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## I. GENERAL INFORMATION

### EXPERIENCE ACHIEVED IN AGRICULTURAL ZONING

Beijing RENMIN RIBAO in Chinese 15 Aug 80 p 2

[Article: Scientific Data Provided for Readjustment of Composition of Agriculture and Patterns of Production; Jiangsu, Sichuan, Heilongjiang, Heibei, and Shanxi Provinces Accumulate New Experiences in Agricultural Zoning"]

[Text] During the year between the State Council's convening last April of the first All-China Natural Agricultural Resources Investigation and Agricultural Zoning Work Conference and the convening in April this year of the second such conference, departments concerned have organized personnel from many disciplines and from all quarters for coordinated combat, under the leadership of party committees and government at all echelons. They have done a great amount of work and have accumulated no small number of new experiences in natural agricultural resource investigation and agricultural zoning work. Because of the different circumstances in some provinces and regions, there has been a difference in emphasis and characteristics in the ways things have been done.

Clear guidance of thought and improvement in leadership methods. As early as 1963, Jiangsu Province made a rather systematic investigation and study of agricultural zoning, and it has used the results of this work for the past several years to promote the steady development of agricultural production. During the past year or so, further emphasis has been given to pragmatism, to grasping the central points, and to overall analysis in order to provide scientific data for the formulation of long-range planning and for the guidance of current agricultural production, so that zoning work will achieve new breakthroughs. The method of leadership adheres to combining "zoning, planning, and models" (by which is meant: first, zoning agriculture; then, developing a plan for agriculture; and finally, setting up a model based on a summary of experiences with different typical cases, and conducting scientific experiments and demonstrations, with the successful ones being promoted), in a conscientious application of the "five grasps": 1) grasp cooperation to make fullest use of the function of research units, institutions of higher education, and departments concerned; 2) grasp the central points, which in the survey of agricultural resources means soil resources primarily, and with provincial-level overall zoning being the focus of agricultural zoning during the first half of the year, and second-echelon zoning throughout the province being the focus of zoning during the second half of the year; 3) grasping test sites to do a good job with models, to gain experience, and to gradually push forward; 4) grasp giving play to academic democracy, with adherence to seeking truth from facts; and 5) grasp the application of results, promptly putting them into service for planning and guidance of production.

Combining of the coarse and the fine; the long term and the short term. Sichuan Province's survey of agricultural resources and agricultural zoning work began with a formulation of production plans and guidance for current agricultural production, and it was done by combining the coarse and the fine, combining the long term and the short term, and combining specialized units with cadres and the masses. The actual methods used were as follows: 1. Posing 39 problems on the basis of the main points of the provincewide agricultural resources survey and the agricultural zoning study plan, with tasks being assigned to 64 scientific units, institutions of higher education, and industrial departments and bureaus, while starting up county-level zoning test sites at the same time in Guanghan and Yanyuan counties. 2. Combining a group of scientific and technical personnel led by specialists with prefectural and county forces to undertake a survey of resources and agricultural zoning work in which a general survey of soils was the focus. This was done in 17 counties of Yibin Prefecture. 3. In 20 counties, including Dayi, Wuling, and Hechuan, the counties relied on their own forces to undertake rough agricultural zoning work. Looked at in terms of the results of a year's experience, all three of these methodshave desirable qualities, and a selection from among them has to be made on the basis of realities so as to proceed from the coarse to the fine in an orderly way to the gradual launching of zoning work.

Devotion of efforts for comprehensive inspection and comprehensive zoning of key areas. The object of Heilongjiang Province's emphasis on zoning was a combination of practicality, stressing major points, and the short and the long term, in order to serve the building of agricultural bases emphasizing commodity grain, in order to serve the acceleration of agricultural development, and in order to serve the realization of the modernization of agriculture. The better this problem is solved, the more it is possible to gain the support of leaders and get a good reception by the masses; it will then be possible to turn the science of agricultural zoning into productivity. Ever since last year, Heilongjiang Province has organized 200 specialists and technicians to make a comprehensive inspection of the Sanjiang Plain, to conduct an across-the-board analysis and comprehensive evaluation of the water, soil, and climate resources there, and to study the factors favoring development of agriculture, forestry, and livestock in the Sanjiang Plain, as well as the problems in setting up a rational economic structure. The province has proposed using comprehensive zoning of the Sanjiang Planin and 19-point special investigative report in order better to use special advantages, to build agricultural bases, and to provide scientific data and scientific recommendations.

Serious attention to technical training; impetus to the launching of zoning work. In undertaking an investigation of agricultural resources and agricultural zoning work during the past year and more, Hebei Province has devoted attention to the training of cadres and technical mainstays at the prefecture, county, and commune levels, first in the two test site counties of Luancheng and Zunhua, and later by using the two test site counties to expand to 15 other counties. Those taking the training included leading cadres in prefectures and counties, principal officers-in-charge at vocational departments and communes, and vocational and technical mainstay cadres at all levels. As of now, a total of more than 9,000 people have been trained throughout the province, and more than 400 technical mainstay cadres who are able to work independently have been trained. Almost 1,000 technicians fairly familiar with vocational work and more than 1,000 farmer technicians have been trained. Through the operation of training classes, a specialized corps with a clear understanding and vocational expertise has been formed. Under the unified leadership of

the local government, a combination of leaders, technicians, and masses are able not only to complete investigative and zoning work through reliance on local forces, but to put to better use the results of zoning, with benefits both for solving real problems in current production and for building long-term production.

Adoption of new technology and acceleration of progress into the investigation of natural resources. Since last year, Shanxi Province has been conducting comprehensive zoning test site work in eight counties, including Taigu and Ji. They have also devoted attention to comprehensive rough zoning work for each specialized trade for the province as a whole, and at the county level. By way of hastening the progress and improving the accuracy of the survey of natural resources, Shanxi Province has organized new technical applications and experimental research work for the agricultural resources survey. First, they have paid attention to aerial surveys. As the result of supplemental surveys made last year and this year, all counties throughout the province are able to provide specialized trades with large-scale aerial photographs from the resources survey. Second, remote sensing experiments were applied in the survey of agricultural resources. From the interpretation of 1:250,000 satellite photographs, they compiled maps showing current land use throughout the province and geomorphological maps to provide data for provincial-level rough zoning. They also conducted aerial remote sensing experiments in Qi and Wenshui counties, using interpretation of 1:20,000 infrared photographs and multi-spectral scanner imagery to make maps--thereby providing scientific data to county-level agricultural zoning. In the survey of underground water, soil, and land resources throughout the county, preliminary experimental use was made of new satellite photograph and aerial photograph technologies in order to improve the accuracy and speed of the work.

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JOINT OPERATION OF STATE FARMS AND COMMUNES BENEFICIAL

Beijing RENMIN RIBAO in Chinese 9 Jul 80 p 2

[Article by correspondent Kong Qingzhi [1313 1987 0037]: "State Farms in Various Places Adopt Various Forms of Joint Enterprises With Communes and Brigades To Enliven the Economy of the Farms and Develop Commune and Brigade Production"]

[Text] Joint agricultural, industrial, and commercial enterprises in the agricultural reclamation system in various places have entered into joint business operations of various kinds with communes and brigades in rural villages. These joint ventures have shown very good economic benefits, both in developing the production of state farms and in helping rural village communes and brigades along the way to prosperity. This way of doing things has been universally welcomed by the farmers.

Joint business ventures between the agricultural reclamation system and the communes and brigades have for the most part taken the following several forms at the present time:

1. Joint commune and brigade enterprises for processing and marketing of goods with return of profits. Yukang County in Zhejiang Province was one instance in which this method was instituted. After the commune and production brigades had completed the state plan, excess products were turned over to nearby joint state farm industrial and commercial enterprises for processing and marketing, with the profits being divided.
2. Signing of economic contracts with production teams, whereby the joint enterprises provide superior varieties and technology to production teams, and the production teams provide products to the joint enterprises. An example is the Joint Agricultural, Industrial, and Commercial Enterprise Milk Powder Plant in Xin County, Shanxi Province. This plant's processing capacity could not be satisfied by the local output of fresh milk. Because of soil and feed limitations, the enterprise was unable to increase the size of its dairy cow herds. Meanwhile, natural conditions in surrounding production teams were good, and they wanted to grow but lacked the necessary capital. The joint enterprise thereupon helped six nearby brigades to operate individual dairy farms, provided technical guidance, and helped train personnel in the feeding of the livestock, in return for which the production teams provided fresh milk to the joint enterprise. Little by little, the joint enterprise recovered the cost of the dairy cows by paying a reduced price for the milk, and by the end of the year, it was able to return some profit to the production team. Both parties made a profit and were very satisfied.

3. Partnership operations with division of profits. The Ba County branch company of the Chongqing Joint Agricultural, Industrial, and Commercial Enterprise, which was already involved in a farm-brigade joint enterprise, last year undertook further specialized operations with more than 300 citrus fruit production teams and orchards throughout the county. They merged the county citrus fruit purchasing station into a joint enterprise to establish a citrus fruit directorate for unified dealings in the production, processing and marketing of citrus fruit throughout the county. Production teams entered a partnership either by providing goods or by paying cash, and profits from the enterprise were paid as dividends on the basis of the number of shares held. This cemented the relationship between the joint enterprise and the production teams more closely than a contract, would have, and it served to advance agriculture toward specialization and socialized production.

4. Joint farm and commune operation of joint enterprises. The Tuanshi Joint Agricultural, Industrial and Commercial Enterprise in Zhejiang Province was jointly formed by the Tuanshi Agricultural Reclamation Farm and 55 production brigades in four nearby communes, with no change in ownership. They jointly operated processing industries and a business for the sale of their own products. After 2 months of test operations last year, economic results were remarkable.

There are numerous advantages in economic union between state farms and communes and brigades. They can, for one thing, make full use of technical capabilities, facilities, and equipment and relatively plentiful capital to develop the farm's economy and increase the income of communes and brigades, thereby accelerating the accumulation of capital for the modernization of agriculture. Preliminary calculations following this year's establishment of a countywide joint citrus fruit operation at the initiative of the Ba County branch company in Chongqing, Sichuan Province, shows that the farmers' income increased by 500,000 yuan. Farmer participation in processing and as a link in marketing helped enliven the economy of rural villages, promoted the development of a commodity economy, and took advantage of the labor potential in rural villages. It helped transform the small rural economy situation of "small but complete" into the development of specialized and socialized agriculture. It was also helpful in cementing relations between the farms and communes and in solidifying the socialist collective economy in rural villages.

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NATIONAL

BRIEFS

**CHANGJIANG WATER LEVEL RECEDES**--Water levels along the entire length of Changjiang have receded to below the warning levels as the flood water emptied itself into the East China Sea. Thus, the people along the river have won their 2-month-long struggle against the most severe flooding in 25 years. Recent torrential rain and flooding caused heavy inundation in some areas along the river. With the help of new pumping stations equipped with huge electric pumps, the inundated area was reduced to only several million mu. In Hunan alone, 15 billion cubic meters of water were drained from the inundated areas between June and August. [Beijing RENMIN RIBAO in Chinese 28 Sep 80 p 1]

**FARM MACHINERY MINISTRY GROUP**--The Ministry of Farm Machinery recently decided to organize work groups to help the three northeastern provinces--Heilongjiang, Liaoning and Jilin--solve problems in developing farm mechanization under the leadership of the Provincial CCP Committees and Governments. A work group arrived in Changchun 9 October. Provincial Deputy Governor Wang Jiping and leading persons of the provincial farm machinery bureau talked with the group and mapped out tasks and work methods. [SK190104 Changchun Jilin Provincial Service in Mandarin 2200 GMT 10 Oct 80]

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BPIEPS

WATER CONSERVANCY--The Nuchan Lake water conservancy project in East Anhui has been completed in June this year after 2 years of hard work in construction. The project is aimed at expanding the area under irrigation by 350,000 mu and improving irrigation for 679,000 mu of farmland. With a water storage capacity of 280 million cubic meters, it had played an important role in draining water from torrential rains in nearby Jianshan County from early June to late July this year, thus saving 50,000 mu of good farmland and the lives of 20,000 people. [Hefei Anhui Provincial Service in Mandarin 1100 GMT 9 Oct 80 OW]

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## TWO NEW STRAINS OF SUGARCANE BRED IN PUJIAN

Beijing RENMIN RIBAO in Chinese 5 Jul 80 p 2

[Article by Xinhua社 correspondent Lin Junqing (2651 0193 0615): "Fujian Breeds Two Superior Varieties of Sugarcane"]

[Text] The Sugarcane and Hemp Institute of the Fujian Provincial Agricultural Academy has bred two superior varieties of sugarcane, "Minxuan 703," and "Mintang 70/611," each of which has earned the Fugian Science Congress' accomplishment award and the Ministry of Agriculture's 1979 award first class for technological improvements in agriculture and livestock raising.

The characteristic these two varieties share is high sugar content. As compared with the "Taitang 134" sugarcane, which is currently grown throughout Fujian Province, for every 100 jin of sugarcane, "Minxuan 703" produces an average of 1.18 jin more sugar. "Mintang 70/611" averages 6.6 liang greater output of sugar.

Another characteristic is high and consistent yields. "Minxuan 703" has 70 percent higher yields per mu than "Taitang 134." "Mintang 70/611" has from 10 to 15 percent higher yields per mu than "Taitang 134."

It takes about 10 years to produce superior variety sugarcane from breeding to popularization of its cultivation. In the case of "Minxuan 703, however, 9 years were required to extend its cultivation over 100,000 mu. In the case of "Mintang 70/611," it began with five seeds in 1970, which were selectively bred, and last year this variety was popularized for cultivation over 20,000 mu. This was the result of the intensive research and arduous toil of comrades in the breeding laboratory in coordination with reliance on the masses and the laboratories of the institute. Each year they must select for evaluation superior plants from among more than 40,000 plants growing on 10 mu of land, and they have set up 24 local test sites throughout the sugarcane producing regions of the province.

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## REFORM OF PLANTING SYSTEM TO CORRESPOND TO NATURAL CONDITIONS

Guangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese  
No 1, 8 Jan 80 pp 14-17

[Article by Yuan Zhiqing (5913 1807 3237) of the Guangdong Provincial Academy of Agricultural Sciences]

[Text] The planting system is a fundamental system of agricultural production. It determines the number of crops, the proportion of planting of crops, the varieties used and the techniques of cultivation. It determines agricultural resources, production materials, the degree of utilization of material techniques and labor force. It determines the mutual relationship between crops and soil, the rise and fall of the fertility of the soil, and the continuation of stable and high yields. A rational planting system can continuously elevate the unit yield and total yield of agricultural crops, and it can also combine the utilization of land and nurturing of the land, gradually elevate the soil's fertility, realize high yields and stable yields, and it is a low cost and complete system of agricultural techniques. Changing an irrational planting system to a rational planting system is a strategic measure to promote increased agricultural production. Reforming the planting system is reforming those planting systems that cannot fully utilize natural conditions and that cannot adapt to the conditions of production so that the planting system that can adapt to the conditions of production can be developed.

### i. The Planting System Is the Product of Historical Development

A rational planting system is always adapted to definite socioeconomic conditions and levels of scientific technology under specific natural conditions. After Liberation our province's planting system in rice fields underwent three vast reforms. The first reform was to change single season rice to double season rice and to change growing of straw to overturning the soil and tilling. These were mainly carried out during the 1950's. This reform was adapted to the socio-economic conditions and productive conditions that emerged after the movement of mutual cooperation and the movement to build water conservancy projects in a big way. The reform was successful. The second big reform was to change double season planting of rice and winter drying and winter fallow land to double season planting of rice and winter planting of green manure. This reform was mainly implemented during the 1960's. At the time, the three-level ownership system and the people's communes were firmly established and developed. The farmer's

enthusiasm in production was riding high, the science and technology levels were high, and the superior short stemmed paddy rice variety that was tolerant of fertilizers was bred. After water conservancy problems were solved, "harvesting more or harvesting less depended upon fertilizers," and fertilizers became the major conflict regarding the use of land. This reform corresponded exactly to the solution of this major conflict and thus remarkable results were achieved, and food grain production jumped to a new height. During the 1970's, the third major reform was launched. The planting system centered around two croppings a year was changed to a planting system centered around triple cropping a year. Because of the many years of basic farmland construction, the water, soil and fertility conditions were improved. The amount of chemical fertilizers, farm chemicals and agricultural machinery all increased. The varieties and the techniques of cultivation were elevated. This major reform was launched upon this basis.

## II. An Evaluation of the Adaptability of the Triple Cropping System

Our province developed the wheat-rice-rice, rice-rice-rice, rice-rice-late autumn potato cropping systems during the 1970's and at the same time actively studied and popularized the multiple triple cropping system of rotation, interplanting and companion planting of food crops and economic crops. The entire province's multiple planting index rose from 210 percent in 1971 to 229 percent in 1978. Practice proves that all reformed systems that are compatible with natural patterns and economic patterns will produce good results, and conversely they will produce bad results. Generally speaking, the triple cropping system is effective in increasing the yields of food crops and economic crops. The wheat-rice-rice triple cropping system has been implemented on 5.59 million mu each year on an average between 1972 and 1978. The total yield of wheat each year averaged 654 million jin. During the same period, the entire province's total yield of food grains increased by 678 million jin. Of this, wheat production increased 428 million jin, constituting 63.1 percent of the total increase in food grain production. It can be seen that multiple planting and one cropping of wheat has performed a very important function in increasing food grain production. The entire province popularized the rice-rice-late autumn potato triple cropping system over about 600,000 mu and in general an increased production of 20 percent to 30 percent was realized over the old system (winter-potato-rice-rice). Because of the implementation of rotation, interplanting and companion planting of food grains and economic crops, the area of planting of several major economic crops was expanded and the total yield was increased. A comparison of 1978 and 1971 shows that the entire province's peanut production increased 29.3 percent, the total production of jute increased 124.5 percent, the total yield of sugarcane increased 46.2 percent. When many counties and communes implemented mainly the double cropping system of food grains, the yield did not increase for many years. After implementing the triple cropping system, some food grains and economic crops realized breakthroughs in annual per mu yield and total yield.

The adaptability of various triple cropping systems in different types of agricultural and economic regions is different. Wheat-rice-rice triple cropping system was more adaptive to high yielding regions where there were more people

and less farmland such as the Chanshan Plain and the Pearl River Delta's fended farmland areas. The system was more adaptive to the locality's natural, economic and productive conditions and scientific and technological levels and it produced greater results in increasing production. In this type of region, the average land per person is only 3/10s to 6/10s of cultivated land. The soil of the farmland is fertile, water conservancy is good, there are plenty of organic fertilizers and chemical fertilizers, labor is sufficient, techniques of cultivation is at a high level, the average per mu yield of each crop of paddy rice has already reached the level surpassing the guidelines. To continue to raise the unit yield of paddy rice is most difficult but multiple planting and one cropping of wheat can more easily produce a greater increase in total yield of food grains. Chaoan County planted wheat-rice-rice over an area constituting 28 to 53 percent of the total area of rice fields each year from 1971 to 1978. High yields of wheat and increased yields of rice and wheat of every crop, increased yields for the entire year, and continued increases in yield were realized. In 1978, the county planted 188,000 mu of wheat, average per mu yield was 252 jin, and there were 36 production teams that had an average per mu yield of over 500 jin. Wheat production constituted 8 percent of the total yield of food grains of the entire county. For the past 7 years, the unit yield of the triple crops of wheat, early rice and late rice in the county continued to rise. Because the fertilizers and supplements applied were greater than the exhaustion of fertility of the soil, and with the addition of the implementation of rotational cropping and improvement of the soil, the fertility of the soil rose. For example, the annual per mu yield of food grains of the Huang Cuo Wei Brigade surpassed "the guidelines threefold" continuously for many years. The content of organic matter in the soil remained at 2.5 to 3 percent and persistently high and stable yields were realized. In regions of medium yields where the soil's fertility is medium, water conservancy in farmland is poor, fertilizers are deficient, the techniques of cultivation are mediocre, but where the conditions for converting the rice-rice-green manure double cropping system as the major cropping system to the wheat-rice-rice triple cropping system as the main cropping system are not yet complete, the results are not ideal enough. But in counties and communes where there are more people and less farmland, the triple cropping system used as an auxiliary planting system is beneficial to increasing the total yield of food grains and also helps tide over spring infertility. Although it is not beneficial to combining utilization and nurturing of land, it can temporarily ease the shortage in the demand for food grains and the necessity of planting. Hua Xian has over a period of 8 years from 1971 to 1978 produced increased yields of wheat which has constituted a relatively large percentage in the total amount of increased yield of food grains, reaching above 20 percent. The proportion of farmland in medium yield regions for implementing the triple cropping system of wheat-rice-rice cannot be too large. If so, the system will not be compatible with the production conditions. There will be more problems. They are manifested by a drop in the unit yield of wheat, a lag in fertilizers, season and management, increased yields in every crop cannot be guaranteed, and often the situation in which wheat is gained but rice is lost will be created, or early rice will be gained but late rice will be lost, fertility of the soil will drop in general, and increased yields cannot be maintained. In some communes and brigades located in the medium yield hilly regions of Nanhai County, where the area of planting of wheat-rice-rice system surpasses 30 percent of the total area of

rice fields, the potential for producing increased yields by double season rice will be limited. Harvesting more wheat causes a reduced harvest of rice and the total yield of food grains for the entire year lingers without advancing. In our province's low yield regions where there are fewer people and more land, the soil is infertile, labor is insufficient, fertilizers are few, techniques are poor, and the conditions are not suited for implementing the wheat-rice-rice triple system, which frequently causes the land to become infertile after planting wheat, and the yield drops, creating a vicious cycle.

The triple cropping system of rice-rice-late autumn potato is very suitable to the natural, economic and productive conditions of some of the regions of Hainan and Zhanjiang. It can promote the favorable conditions and avoid the damages. It can fully utilize superiority of the seasons. Changing winter potato to late autumn potato solved the conflict between early planting of winter potato and late harvesting of late rice and the conflict between late harvesting of winter potato and early transplanting of early rice. The potatoes had a longer growth season and temperature conditions were more suitable for expansion of the potato pieces, therefore unit yield was raised to a large extent. Early planting of early rice in the Zhanjiang area can avoid "floods" and damage by second generation paddy rice borers. Planting of intermediate rice in Hainan produces a higher and more stable yield than planting late rice because it can better avoid damage by typhoons, torrential rain and internal waterlogging. This type of triple system can also realize a combination of utilization and nurturing of land to a definite degree. Planting potatoes after rice can thicken the loose tillering layer. Because of the additional application of organic fertilizers when planting potatoes and the return of 1,000 and 2,000 jin of potato seedlings to the fields per mu, the soil's fertility can be maintained or raised.

During the mid-1970's, our province began to popularize the triple cropping system of rice-rice-rice. It once covered 700,000 mu. But this triple cropping system requires relatively high productive conditions, the soil of the fields must be fertile, water conservancy must be of a high standard, there must be sufficient organic fertilizers, chemical fertilizers, farm chemicals, nylon sheets, labor and machinery, but at present the economic situation of a majority of our province's communes and brigades cannot satisfy these conditions. Thus the triple cropping system of rice-rice-rice was implemented for only 1 to 2 years and lagged behind. Now, only over 1,000 mu throughout the entire province is still being planted under this system. There are also other important reasons why this type of triple cropping system is not easily implemented: One is that the system is not immune from disasters. Because of the additional planting of one crop of intermediate rice, early rice has to be planted even earlier during the season, and late rice has to be planted later in the season. At these times, damage by "return to cold in spring" and "winter dew wind" occurs. The second is damage by insects and diseases. Intermediate rice becomes the "bridging fields" for the growth and propagation of diseases and insect pests which damage late rice. The third is high cost and reduced income.

In the combination of food grain crops and economic crops in the triple cropping system, wheat-peanuts-rice (or wheat-rice-peanuts) triple cropping and peanuts-rice potato triple cropping are more adaptable in medium yield regions. This

makes food grains outstanding and develops oil. Rotation of graminaceous crops and bean crops combines utilization and nurturing of land and benefits banking of fertilizers and fertility of the land, thus maintaining increased yields. If the seasons can be separated, such a triple cropping system can rationally utilize labor, animal labor and machinery labor. It can provide fine feed and green feed, promote the development of animal husbandry. It can earn a lot of income, its cost is low, and its economic benefits are great. Dongwan County has planted wheat-peanuts-rice over large areas during the recent year in the medium yield hilly regions and harvested an additional crop of peanuts, and the total yield of paddy rice increased. In the high yielding enclosed fields in water regions, the total yield of peanuts increased greatly, although the total yield of early rice reduced, peanuts left in the ground, their seedlings and bran solved the deficiency of base manure and stimulated an increase in yield of late rice. Because there was oil and bran, the economy of the communes and the brigades became more active. The triple cropping systems of rice (companion crop)-jute-rice and peanuts (companion crop)-jute-rice have a wider adaptability and they can solve the conflict of competing for land among paddy rice, peanuts and jute. An extra harvest of jute was realized and the soil was improved. These systems were developed in Fuoshan, Huiyang, Zhaoqing, Zhanjiang and Shantou areas and the economic benefits were good.

But, during the 1970's, our province's reform of the planting system also contained many problems. The main problems were these: Some places have done everything "in one shot" and have neglected suiting measures to local circumstances. The land has been used to much while the land was nurtured scarcely. The soil's fertility decreased gradually and as a result, increased production could not be maintained. There was overemphasis on planting of food grains and the overall development of economic crops and animal husbandry was not sufficiently promoted. When deciding on the planting system, unilateral emphasis was placed on the study of singular factors of the utilization of light and temperature and techniques of cultivation while comprehensive analysis of social, economic and productive conditions was lacking. For many years, even though much effort has been spent on planting food grains, growth has still been relatively slow. The area of food grain crops was too large, the proportion of crops that nurtured the land was too small, food grain production could not be continually increased, and the development of economic crops was also limited, thus income was low, and rations were few. The entire province's total food grain production in 1978 registered only a 3.4 percent increase over that of 1971. Although economic crops developed somewhat, our province's unique natural resources were not fully utilized. The speed of development and the level of yields of some economic crops both lagged behind advanced provinces. In 1978, each commune member received an average of only 77.41 yuan from the collective throughout the entire province and 460.8 jin of rationed grains, an increase of only 1.63 yuan over 1971 and the rationed grains were even less by 10.2 jin.

These problems reflect the fact that our province's reform of the planting system has not completely been adapted to natural conditions, conditions of production and objective economic patterns.

### III. The Direction of Reform of the Planting System for Future Years in Our Province

Our province has sufficient temperatures, light and rain. These provide extremely favorable conditions for the development of multiple cropping systems, and planting of many different types of crops. But the threat of disease, insects and wind (typhoons, cold dew winds, winds of 5 April) is great. These present difficulties for the planning of multiple crops. The outstanding problem in the productive economy is too many people and a scarcity of cultivated land. The soil's fertility is rather low; low yielding farmland constitutes over half of the total area of rice fields. The foundations of organic fertilizers and green manure are relatively weak. The amount of chemical fertilizers is not plentiful. Therefore fertilizers are the major cause of the slow increase in agricultural production in the present stage. Thus, reform of the planting system should be based on increasing fertilizers and improving the soil and cultivating fertility of the land. The true nature of agricultural production is the utilization of solar energy to produce products, but full utilization of light is closely related to the full utilization of land. To fully utilize land, there must be active nurturing of land. Fertile land is the foundation for crops to grow prosperously and to fully utilize solar energy. With this foundation, agricultural production will be able to increase on an overall basis and continuously, and increased production of food grains can be realized and at the same time a greater development of economic crops and animal husbandry can be stimulated.

According to the policy of "taking food grain as the key link, overall development, suiting measures to local circumstances, appropriate centralization," our province's planting system should be appropriately adjusted. The relationship among food grain crops, economic crops and animal husbandry, the relationship among raising unit yield, expanding the multiple planting index and increasing the total yield, the relationship between utilization and nurturing of land, the relationship among fine tilling and fine planting, the labor force, machinery, and planting in the proper seasons, and the relationship between increasing yield and increasing harvest must be correctly handled well. In future years, the direction of reform of our province's planting system should be to readjust the past emphasis on the planting system of triple cropping of food grains to a plan of proportional coordination between food grain crops and economic crops. The crop structure that uses too much land should be readjusted to a combination of using and nurturing the land and a structure of nurturing the land while the land is being used. The proportion of the triple cropping system of food grains should be appropriately reduced, and the proportion of triple cropping system or the double cropping system of food grain and oil, food grain and sugarcane, food grain and jute, and food grain and green manure crop should be expanded. Practice during the 1970's has proven that there are outstanding conflicts when the area of triple cropping of food grains is too large and shortcomings outnumber advantages: One is that the cropping system was not compatible with the conditions of production and management of techniques. The second was that too much land was being used. Few efforts were made to nurture the land, and the system was not compatible with the nature of the soil. The tilling layer became shallow, the plow pan layer became thick, the soil became stiff, aeration became poor, the release of nutrients became slow,

the intake of chemical fertilizers increased, fertility dropped, and unit yield and total yield both could not be increased. The third is continuous cropping for many years, diseases and insects occurred and spread. It was difficult to raise the yield. The fourth was the creation of tight planting seasons which hindered a coordinated development of triple cropping. The first crop limits the second crop and it was difficult to realize increased yields for every crop and total annual yield. Food grain crops also limited the economic crops and overall development of production was affected. The fifth was lesser economic returns. The collective rations of the commune members remained at a low level for a long time. Therefore the multiple index of food grain crops was too large and the results rendered an opposite effect. Even when the yield of food grains increased within a short period, but throughout the entire year, food grain production was still unable to break through the lingering and stagnant situation. Therefore, in future years, except for certain high yielding regions where there are more people and less land, where food grain rations are not abundant, where supplementary application of fertilizers can be greater than the exhaustion of fertility of the land, the proportion of land for the triple cropping system of food grains should be lowered. The area for the triple cropping system of wheat-rice-rice throughout the province should be controlled at below 5 million mu, a 28 percent reduction of the over 7 million mu in the peak period of development. In most of the regions throughout the province, future reform of the cropping system should mainly be the development of the triple cropping system of food grains and economic crops supplemented by the triple cropping systems of food grains and the double cropping systems of food grains and economic crops and food grains and green manure crops. This can better adapt to the socio-economic and productive conditions of the present stage. There are more advantages in developing the triple cropping system of two food grain crops and one economic crop, such as wheat-peanuts-rice (or wheat-rice-peanuts), peanuts-rice-potato, soybean-rice-rice, rice (companion crop)-jute-rice, peanut (companion crop)-jute-rice, rice-rice-vegetables and the double cropping system of rice (or peanuts, soybeans)-sugarcane in rotation cropping, intercropping and companion cropping. One advantage is that they can sustain increased yields of food grains and can give a definite proportion of planting to economic crops. In medium and high yielding regions, developing the double cropping system of rice-peanuts and peanuts-potatoes will give an overly large proportion to the original economic crops and they cannot adapt to the ever increasing need for food grains in society. But overly expanding the triple cropping system of food grains such as barley-rice-rice will also limit the development of economic crops and seriously exhaust the land's fertility. The triple cropping system of two food grains and one "economic crop" has a suitable proportion and it can better coordinate the conflicts of all sides, unifying food grain production, production of economic crops, utilization of land and nurturing of land. The experience of many places has proven that planting one crop of food grains less and substituting it by planting leguminous economic crops can produce double bumper harvests of food grains and oil. Even if less food grains are harvested temporarily, but over many years, unit yield and total yield of food grains can continue to rise and reach a new level. The second is that it provides a broad leeway for the development of economic crops and makes it possible to fully utilize our province's unique natural resources. The third is banking of fertilizers and nurturing the fertility of the soil, solving the problems in organic fertilizers

and establishing a firm foundation for the continued increases in yield. According to studies, each mu of peanuts can fix over 8 to 12 jin of nitrogen. Each mu of soybeans can fix over 10 jin of nitrogen. Each mu of astragalus can fix 8 to 9 jin of nitrogen. Each thousand jin of peanut seedlings can increase the yield of rice by 80 to 100 jin. Each jin of peanut bran can increase the yield of rice by 3 to 5 jin. Planting of rice in fields previously planted with peanuts can produce an increased yield of 80 to 100 jin of rice per mu. According to the fixed point studies conducted by the soil and fertilizer institute of the provincial agricultural science academy, 3 years after planting the triple cropping system of two crops of food grains and one crop of oil crop, the soil's fertility rose remarkably. The tilling layer which was shallow deepened, the soil which was grayish yellow changed to grayish black, the soil which was compact became loose, the unit weight (the comprehensive indicator that reflects the changes of such factors as soil's fertility) dropped to 0.14 - 0.17 gram/centimeter<sup>3</sup>, while the porosity of the soil rose by 5.3 to 6.4 percent. The content of organic matter in the soil rose by 0.3 to 0.4 percent, the content of nitrogen rose slightly, and the amount of phosphorus and potassium increased more. Rotation cropping with jute and sugarcane can also raise the productivity of the rice fields. Each mu of jute can provide 1,000 to 2,000 jin of remnant fertilizers, roots and leaves. Each mu of land previously planted with sugarcane can provide remnant fertilizers for planting rice and can produce an increased yield of 40 to 50 jin of rice. The third is that it can fully utilize light and temperature resources. According to surveys conducted by the provincial academy of agricultural sciences in Boluo and Huiyang counties, the utilization rate of light and temperature conditions and the growth seasons of the entire year of the triple croppings of wheat-peanuts-rice and soybeans-rice-rice reached 80 to 90 percent, while the controlled double cropping system of double season rice reached only 60 to 65 percent. The rate of the triple cropping system of rice-rice-rice was 70 to 75 percent. The fourth is that it is advantageous to the development of animal husbandry. In all the commune brigades where the proportion of the triple cropping system of food grains and oil crops is larger, collective hog raising was able to develop rapidly because massive amounts of bran and vines were provided by the bean crops and were made into powder as feed. The fifth is that its economic return is great and it can quickly improve the livelihood of the commune members. According to research data compiled at fixed localities in Huiyang County by the soil and fertilizer institute of the provincial agricultural science academy, the productive value of each yuan of investment of the triple cropping system of wheat-peanuts-rice was higher than the system of wheat-rice-rice by 19 percent. The productive value of each day of labor was higher by 26.5 percent. Some brigades increased the area of triple cropping of double crops of food grains and one crop of oil crop and the amount of rationed food grains, rationed oil and cash income all rose visibly.

In low yielding rice fields, the conflict for "fertilizers" is more outstanding. The proportion of crops that nurture the land should be even greater. It is suitable to massively propagate rotation cropping of paddy rice and peanuts. The planting of winter green manure and bean crops should be expanded. These should be strategic measures to hasten the banking of the fertility of the land and change low yields to high yields. An alternate system of improving the soil and

increasing fertilizers and sustaining increased yields of food grains and oil is to use the double cropping system of rice-peanuts, peanuts-rice, peanuts-rice-green manure, rice-rice-green manure, beans-rice-green manure as the major systems and using the triple cropping system of two food grain crops and one oil crop as a supplementary system.

Each person in our province has only 8/10s of cultivated land, below the national average. Therefore, the planting system must be highly intensified. Multiple croppings must be planted to a highest degree possible on a unit area, more work must be done and more investments must be made to greatly elevate the rate of production of the soil so that the need for agricultural products by large numbers of people can be satisfied. This is not the same as in the United States where people are few and land is plentiful. These countries have a very high rate of labor productivity, but the productivity of the land is lower than our nation. We must walk our own road. Because our province's cultivated land is scarce, to increase the yield of food grains and to increase the yield of economic crops as well as to expand the planting of green manure, interplanting and companion planting must be grasped to coordinate the conflicts of competition for land and for planting seasons among crops. For example, the interplanting of wheat and astragalus, interplanting of peanuts and wheat, interplanting of winter tobacco wheat, interplanting of vegetables and wheat, companion planting of rice and jute, companion planting of peanuts and jute, companion planting of rice and sugarcane, companion planting of peanuts and sugarcane are all ways which have proven to be good methods after many years of test planting and they are suitable for expansion and popularization.

Our province's territory is expansive. The differences in natural, economic and productive conditions are very great. "The southern branches face the warmth while the northern branches are cold, one spring wind has two different aspects." Reform of the planting system must emphasize suiting measures to local circumstances and "doing everything with one single effort" must never be done. Different conditions require different structures in reforming the planting system. In different types of productive regions, a reasonable planting and rotational cropping system that is based mainly on one or two planting systems combined with a multiple planting system should be gradually studied and established.

When people set up a planting system, they must do the work in an objective way so that it can be compatible with the natural, economic and productive conditions. When the conditions do not change, the system should correspondingly be firmly established. When the conditions change, and when the limiting factors are broken through, new reforms should be made. Engels said: "The productive forces under man's control are endless. Using capital, labor and science, the gain from the land can be raised without limit." We should strengthen scientific experimentation, create conditions, promote the planting system to progress towards an even higher stage to obtain even greater economic returns.

'XINHUA' REPORTERS CALL FOR PROTECTING FORESTS IN GUANGXI

OW232359 Beijing XINHUA Domestic Service in Chinese 0702 GMT 22 Oct 80

[Letter from XINHUA reporters: "No Further Destruction of the Natural 'Green Reservoir'"]

[Excerpts] Nanning, 22 Oct (XINHUA)--Dayaoshan is a treasure mountain located in central Guangxi. It is so called because there are both forests and sources of water.

There is sufficient rainfall in the Dayaoshan area. The average annual rainfall is 1,900 millimeters, with the maximum of some 3,000 millimeters, or 25 percent more than that registered in the surrounding counties. According to findings by the autonomous region in a water-source forest investigation conducted in 1977, the annual volume of water (including forest water conservation and runoff) produced in the Dayaoshan forest area is 2.4 billion cubic meters. For this reason, the area has been hitherto called the natural "green reservoir." The rich amount of water flows to the surrounding counties through 25 rivers and, in addition to watering some 30,000 mu of paddy fields belonging to seven communes of the Jinxiu Yao Autonomous county in the Dayaoshan area, it also directly irrigates more than 850,000 mu of farmland belonging to 7 counties and 41 communes in the adjacent 4 prefectures.

However, this important forest area with abundant source of water is subjected to continued, serious destruction. In the 20 years, from the time of cutting trees to make charcoal for refining iron and steel in a big way in 1958 up to the period of the 10 chaotic years, an average of 16,000 mu of forests were destroyed every year as a result of reclaiming wasteland to plant grain crops and wanton tree felling. Added to the more than 200,000 mu destroyed by forest fires, the total area of forests destroyed is equal to two-thirds of the area afforested and preserved in the same period.

Since large tracts of water-source forest were destroyed, the forest area's capability of conserving water and soil has decreased while disastrous droughts have increased and the amount of special forest products has been sharply reduced. According to the findings of an investigation conducted in 1977, the regular water flow of 22 out of the 25 comparatively large rivers has decreased one-third compared with the time prior to 1958.

This condition has aroused the attention of the Autonomous Regional Party Committee and Regional People's Government. However, due to the lack of specific measures taken, the act of destroying water-source forests is continuing.

Furthermore, the grain ration for commune members in the forest area has been always lower than that for the commune members of the surrounding grain-producing counties. Last year, the ration for commune members in the surrounding grain-producing counties was over 600 jin while that for the commune members in the forest area was merely 420 jin. The people in the forest area are urged to protect water-source forests but are not given enough food to eat. What can they do if they do not choose to reclaim some forest land to grow grain crops?

Pending a solution to this practical problem, the protection of the water-source forests in the Dayaoshan area remains a lip service.

The hundreds of thousands of people of various nationalities who share weal and woe with the water-source forest area in Dayaoshan are shouting with a loud voice: the leaderships at all levels are requested to take practical steps to protect the Dayaoshan water-source forests. No further destruction to the natural "green reservoir."

CSO: 4007

BRIEFS

COTTON PROCUREMENT MEETING--Hebei Province recently held a conference on procurement of cotton and agricultural and sideline products. At the closing session, Yue Zongtai, deputy secretary of the Provincial CCP Committee and vice provincial governor, attended and spoke. [Shijiazhuang Hebei Provincial Service in Mandarin 0430 GMT 15 Sep 80]

HEBEI ANTI-DROUGHT INSTRUCTION--The Hebei Provincial CCP Committee and the Provincial People's Government recently issued instructions on fighting drought and promoting livestock production. The instructions said: Party committees and governments at all levels must attach great importance on protecting livestock and lay a good foundation for livestock production. The instructions proposed six measures for combating drought and protecting livestock: 1) implement all policies concerning the raising of livestock; 2) all departments concerned must promote pig procurement work and increase pork sales; 3) mobilize the communes and brigades to promote fodder supply; 4) work hard to fulfill or overfulfill the state's quota for livestock production; 5) improve breeding techniques and raise the breeding rate; and 6) regulate the responsibility system of livestock production. Party organizations at all levels must understand the conditions in every locality and help them fight against drought. [HK161340 Shijiazhuang Hebei Provincial Service in Mandarin 0430 GMT 18 Sep 80]

HEBEI RELIEF GRAIN--The Party Central Committee and the State Council were concerned with the livelihood of the people in the disaster areas and decided to appropriate 1 billion jin of relief grain to Hebei Province in August, September and October. By 16 September, Zhangjiakou, Chengde, Hengshui and Cangzhou Prefectures had received 0.236 billion jin of relief grain. Heilongjiang Province also sent 33 million jin of grain to Hebei Province in September to provide disaster relief. [Shijiazhuang Hebei Provincial Service in Mandarin 0430 GMT 19 Sep 80]

CSO: 4007

MANAGEMENT SYSTEM FOR AGRICULTURAL RESEARCH CHANGED

Beijing GUANGMING RIBAO in Chinese 27 Jul 80 p 1

[Article by Zheng Xiaofeng [6774 4562 2800]: "Heilongjiang Province Reforms Agricultural Research System. Relies on Scientific and Technical Strength To Hasten Development of Agriculture"]

[Text] Heilongjiang Province recently changed its system for the management of agricultural research, which was based on the administrative system, to a new agricultural research management system based on production needs, local characteristics, special strengths, and facilities in order to quicken the pace of agricultural modernization.

Heilongjiang Province came to realize as the result of long experience that basing its system for the management of agricultural research on the delineation of administrative districts had many drawbacks. For example, half of the 12 major soil categories throughout the province have still not been studied. Only two or three people were studying each of the three low productivity soils that make up 20 percent of the cultivated land in the province. Of the 12 major crop diseases, five are still unknown from a scientific standpoint. Beginning last autumn, the Provincial Agricultural Office and various associated bureaus undertook a wide-ranging investigation of the readjustment of research organizations, and reforms are already underway in three different spheres.

The first is the breakup of "small but complete" and the institution of specialization, regionalization, and a change in the irrational three-tier pattern of distribution of agricultural research among the province, the prefectures, and the counties. The postreform provincial-level research organization will become the core of specialized research. The thrust of research by county-level agricultural institutes, it was decided, would be intermediary research and demonstrations, primarily for promotional purposes to fill in gaps in provincial and prefectural special fields of study. Under the unified guidance of the Provincial Academy of Agricultural Science, and in keeping with the characteristics and special natural advantages of the prefectures, new divisions have been established for prefectural agricultural institutes as to the thrust of their specialized agricultural research, as follows: Songhuajiang Prefecture is to concentrate its research on economic crops. Suihua Prefecture is to emphasize research on soybeans and mechanized farming. Mudanjiang Prefecture is to conduct research on paddy rice, tobacco, beekeeping and white bentonite soil, principally. Nenjiang Prefecture is principally to do research into foodgrains other than wheat and rice and into drought-resistant farming techniques. Hejiang Prefecture is to carry out research principally on improvements to varieties and farming in the low-temperature lands of the Sanjiang Plan. Heihe Prefecture's principal research area is to be wheat and bean crops grown in high and frigid regions.

The second is the breakup of boundary lines between different fields of endeavor, the institution of coordinated organizations, a change in the mutual lack of communication among various specialized fields and among various branches of learning, and a change in the situation wherein the various links of research, promotion, and production are divorced from one another. The postreform provincial, prefectural and county agricultural offices will take charge of the organization of the coordination among various agricultural research and promotional units.

The third is a change in the situation whereby technical promotion units cannot do technical work, and the institution of a system of personal responsibility. Stations for the promotion of agricultural techniques, livestock veterinary medicine stations, water conservancy stations, forestry industry stations, farm machinery stations, seed stations, soil and fertilizer stations, water and soil maintenance stations, and meteorological stations in each county are units with technical functions that should be engaged in technical promotion, in technical service, and in technical management work. Their authorized strength and operating expenses should not be infringed upon, nor should agricultural technicians be arbitrarily transferred to do nontechnical work; they should be assured that five-sixths of their time will be spent on technical work. Beginning this autumn, every organization on every level in the province, prefectures, counties, and communes shall annually check on the implementation of research work and promotion plans, evaluate and pass judgment on scientific and technical accomplishments, and give prizes for brilliant exploits. In cases where plans have not been fulfilled, the reasons should be looked into, and where the failure has resulted purely from human actions, responsibility should be fixed.

9432  
CSO: 4007

ESTABLISHMENT OF COMMODITY GRAIN BASES TO BE ACCELERATED

Beijing RENMIN RIBAO in Chinese 28 Jul 80 p 1

[Article: "Heilongjiang Strengthens Establishment of Commodity Grain Bases To Make the Most of Special Advantages and To Contribute More Grain to the State in the Shortest Possible Time"]

[Text] The Heilongjiang Province Party Committee recently convened its enlarged standing committee to study and implement the State Council's decision on vigorous development of farm mechanization in the northeast and the accelerated establishment of commodity grain production bases, principally for grain and soybeans. The meeting decided that full use would be made of the special advantages of Heilongjiang Province in abundant natural resources for agriculture, and that through the vigorous support provided by the use of state financial and material resources, fully developed modernized bases for agriculture, forestry, livestock raising, sideline occupations, and the fishing industry, with emphasis on commodity grains, would be established as quickly as possible throughout the province to contribute more foodstuffs to the country rapidly.

Following conscientious discussion and wide solicitation of views by the expanded committee, the Provincial CCP Committee proposed three major measures for strengthening the establishment of commodity grain bases in Heilongjiang Province.

1. Place the mechanization of agriculture on a par with the establishment of commodity grain bases, giving attention to this key link in bringing about the modernization of agriculture. Acting in a practical way on the basis of requirements and capabilities, begin adapting methods to local situations and categorize guidance for mechanization tasks, standards in matching equipment, and speed.
2. Adhering to the policy of walking on two legs, institute a combination of increased yields per unit and expansion of the land area under cultivation. Reclaim 5 million mu of wasteland each year for the next 5 years, as the state has demanded, with 2 million mu being used for state farms and 3 million mu going to people's communes. Party committees at all echelons must give intense and practical attention to this land reclamation work, fulfilling the task in terms of both quality and quantity. Thorough planning must be done from the provincial to the local levels for rational use of land resources, using for agriculture the land that is suitable for agriculture, land suitable for livestock raising for livestock raising, land suitable for forestry for forestry, and land suitable for the fishing industry for the fishing industry. When reclaiming land, attention must be given to the protection of woodlands, grasslands, and reed ponds and to the maintenance of the natural environment and climate, in order to help establish a new ecological balance.

3. Strengthen leadership, rapidly shifting the work of all trades and industries to hasten the establishment of commodity grain bases. All echelons of party and government organizations should place the promotion of farm mechanization and good land reclamation work on the important agenda of the party committees and the government. Each prefecture, municipality, county, and commune should formulate plans for the substantial mechanization of agriculture next year and for the next 5 years, using production brigades as the basic units therefore, basing these plans on investigation and study, and acting on policy guidance provided by the Provincial CCP Committee. They should also formulate specific, detailed plans for the reclamation of land, such plans to be implemented by counties, communes, and farms. The masses should be fully brought into the deliberations, rather than have everything done from above.

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CSO: 4007

BRIEFS

**HEILONGJIANG TIMBER PRODUCTION**--In a talk to a station reporter, (Wang Guangwei), secretary general of the Heilongjiang Provincial People's Government and leader of the provincial timber comprehensive utilization group, stressed the need to build Heilongjiang Province into a base for timber production and comprehensive utilization. He said: More than 200 varieties of timber products have been processed in the province. Some have been exported to Hong Kong, America and Japan. This year's total output value of timber comprehensive utilization is estimated at 260 million yuan, 85 percent higher than last year's actual output value. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 18 Oct 80]

**HEILONGJIANG AUTUMN HARVEST**--Heilongjiang Province has so far reaped more than 85 percent of its autumn-harvested crops. Most communes in Songhuajiang Prefecture have completed their harvest work. Suihua and Hejiang Prefectures have completed more than 90 percent of the work. Of the 23 million mu of soybeans in the province, 14 million mu has been reaped. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 10 Oct 80]

CSO: 4007

## SOYBEAN PRODUCTION RAPIDLY RESTORED

Chengzhou HENAN NONGLIN KEJI [HENAN AGRICULTURAL AND FORESTRY SCIENCES AND TECHNIQUES] in Chinese No 6, 10 Jun 80 pp 17-18

[Article by Tu Jiaji [1458 1367 7535] of the Provincial Agricultural Office  
Rapidly Revive Our Province's Soybean Production]

[Text] I. Our Province Has a Long History as a Summer Soybean Producing Region

Our province has a long history of planting soybeans. Inscriptions on bones and tortoise shells of the Yin Dynasty ruins already contained records of "shu."

During the 1950's, our province's soybean production developed smoothly from the 18.46 million mu at the beginning period after Liberation (3-year average of 1949-52) to 24.48 million mu (5-year average from 1953 to 1957). Total yield rose from 1.79 billion jin to 2.11 billion jin. Each year, over 20,000 tons were exported by the foreign trade departments. At the time, the total area of soybean, peanuts and other indigenous beans was 40 million mu, constituting one-third of the total cultivated land of the province. But after 1960, production planning lost balance, unilateral emphasis was placed on the belief that soybean was a low-yield crop. Some localities inappropriately expanded the areas of planting of corn and sweet potatoes and soybean was eliminated. At the same time, discrimination against soybean was reflected in production management. The "three afterwards" and "three refusals" were exercised, i.e., plant soybeans afterwards, manage soybeans afterwards, harvest soybeans afterwards, refusal to provide fertilizers, investment and labor force for planting soybeans, thus the area of planting soybeans became smaller and smaller and the level of production became lower and lower. In 1978, the area of soybeans had dropped to 13.073 million mu, total yield was 1.39 billion jin. A situation of stagnation occurred. A series of problems in production and livelihood occurred. The more the land was planted, the more infertile it became. The food structure became bad and there was a shortage in good feed for domesticated animals. To nourish the land for a balanced development of agriculture and animal husbandry, to improve the livelihood of the people of the cities and villages, develop light industry and expand foreign trade, our province's soybean production must be revived and developed with great efforts.

## II. Multiple Uses of Soybeans

Soybean contains 40 percent protein, 20 percent fat, and its nutritional value is very high. Soybean oil is unsaturated fatty acid. It can soften the blood vessels and cut down the function of cholesterol. Its content of iodine is high and it contains a semi-dry oil. Soybean has many uses in light industry, national defense industries and the food industry. The United States is advocating the use of soybean protein to make meat substitutes to replace pork and beef, the use of soybean oil to make imitation butter and cheese to replace real butter and cheese, and the use of soybean fibers to make high-grade nylon. Soybean utilizes nodule bacteria to fix nitrogen. Soybean plants can fix 16 to 17 jin of nitrogen per mu per season. Besides using up 7 to 8 jin of nitrogen themselves, a lot of nitrogen is left in the soil. It can be absorbed and utilized by the following crop. The stalks and pods of soybeans are all feed for domesticated animals and can also be used as fuel. Soybean cakes are precious and fine feed.

## III. How Can Our Province's Soybean Yield Be Increased?

Our province has always neglected research in improving soybean varieties and techniques of cultivation. With the additional emphasis on the belief that soybean is a low-yielding crop, planning was imbalanced, therefore the varieties have become impure and degenerate. Serious damage has been caused by sowing during crop openings when the soil was hard, lack of fertilization and lack of irrigation, lack of thinning the seedlings and lack of intertilling, three insect pests (*etiella zinchenella*, *clanis bilineata* and cutworms). To revive and develop our province's soybean production, the following techniques must be grasped well and conscientiously:

(1) Selective use of superior varieties: Besides efforts to develop the work of improving the varieties, the presently available superior varieties of soybeans must be actively popularized. The varieties of soybeans suitable for propagation in our province are Xuzhou 421, Zhengzhou 135, Zhengzhou 126, Xudou No 4, Yaojin No 5. These varieties generally yield 20 percent more than the mixed and degenerate soybean varieties. Although soybean is strictly a self-pollinating crop, it is very easily mixed mechanically, therefore selection of plants must be insisted upon to establish plant rows, plant line nurseries to extract the pure ones and revive the strong plants. In addition, our province has many historically well-known and precious soybean varieties such as wai shi da qing dou, tian e dan, shuang qingdou. These must be produced again quickly to satisfy the needs of foreign and domestic markets.

(2) Reasonable application of fertilizers and mixing bacterial fertilizers with seeds. Application of fertilizers for soybean is determined by the fertility of the soil of the previous crop. Generally, only a small amount of phosphorous fertilizers or no fertilizers are needed for land of a forecrop of wheat yielding more than 500 to 600 jin per mu. In wheat fields with a forecrop yielding only 300 to 500 jin, phosphorous fertilizers should be applied as the major fertilizer and nitrogen fertilizers should be applied during the seedling period and flowering period accordingly. Wheat fields with a low-yielding forecrop of below 300 jin require the application of 3,000 to 5,000

jin of farm house manure as base manure per mu and nitrogen fertilizers must be applied accordingly during the seedling period and flowering period.

Soybean utilizes nodule bacteria to fix nitrogen. Nodule bacteria uses haemoglobin and molybdenum as catalysts to synthesize nitrogen in the air and hydrogen in water to form amino acids. Therefore, applying ammonium molybdic acid at the roots of soybean as sidedressing will produce a remarkable increase in yield. In 1978, our office applied ammonium molybdic acid using an airplane over more than 5,000 mu during the soybean's beginning flowering period in Xihua County. The chemical was applied as sidedressing for the roots. Each mu used 20 to 35 grams of ammonium molybdic acid diluted with 100 jin of water. The average increase in yield was from 8 to 11 percent.

Inoculating nodule bacteria into soybeans can hasten the formation of root nodules. Generally, mixing 15 to 20 grams of bacterial powder with the seeds per mu can produce an increase of 10 percent in yield.

(3) Sufficient moisture at the time of sowing assures full seedlings and even seedlings. The seeds of soybean are large, they contain a lot of oil and protein which do not decompose easily. At the time of budding, the seeds absorb water and weigh 1.5 times their own weight. Drought frequently occurs at the beginning of summer in our province. Therefore, whether soybean should be sown by plowing the soil is determined by the moisture conditions of the soil after harvesting of wheat. When the moisture condition is good or where water conservancy is available, the soil must be plowed or raked to remove the stubble for sowing. Generally for moist conditions, the moisture must be retained when the soil is hard during the opening for sowing. If torrential rain falls after sowing, hardpan soil must be broken when the soil becomes hard to preserve all the seedlings. After the seedlings emerge, the seedlings must be thinned in time. Generally seedlings that are thinned by hand will produce an increased yield of 20 percent more than seedlings that have not been thinned.

(4) Conscientiously prevent and control diseases and insect pests.

In general, as long as scientific planting is implemented, the soybean yield will surely be increased rapidly.

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CSO: 4007

HENAN

DRAFT ANIMAL POPULATION IN HENAN CONTINUES TO DECLINE

OW240038 Beijing XINHUA Domestic Service in Chinese 0253 GMT 23 Oct 80

[Letter by XINHUA reporter Zhou Guohua: "Why is the Production of Draught Animals Continuing to Decline in Henan?"]

[Excerpts] Zhengzhou, 23 Oct (XINHUA)--Since the 3d Plenary Session of the 11th Party Central Committee, great importance has been attached to animal husbandry throughout the country and a fairly large increase in livestock production has been achieved. However, draught animal breeding has not developed satisfactorily in Henan Province, which plays an important role in animal husbandry in China's agricultural zone. A decline in livestock breeding has been reported for years, except for a slight increase in 1979, and livestock production is now tending to decline.

In the early period after liberation, the number of draught animals bred throughout Henan Province once reached some 7 million head. After 30 years, the number has dropped, instead of increasing, to some 5 million head.

Funds for livestock breeding should account for 32.1 percent of the total funds for agriculture and animal husbandry in each province, as stipulated by the state council. Funds appropriated for livestock in Henan amount to only 23.78 percent.

Many of the 20,000 veterinary workers in the province cannot now get paid their monthly wages, not to mention funds for activities. Due to lack of funds, work on the prevention and control of livestock diseases has been suspended at many people's communes and production brigades. As a result, whenever an epidemic occurs, nothing can be done but to watch the livestock die.

It is obvious that many serious problems remain to be solved in promoting draught animal breeding in Henan Province. However, to make the matter worse, the leading departments concerned in Henan Province have not taken any effective measures.

On behalf of the masses, we would like to make this appeal: will leaders and leading departments concerned consult with each other and appropriate a small amount of funds to save these draught animals?

CSO: 4007

HENAN

BRIEFS

PUREBRED WHEAT VARIETIES--Virtually all major wheat varieties grown in Xinxiang Prefecture of Henan are purebred strains. This year this prefecture produced more than 73.5 million jin of purebred wheat seeds, some 6 million jin of which was supplied to other areas after all local demands were met. [Beijing RENMIN RIBAO in Chinese 10 Sep 80 p 5]

CSO: 4007

BRIEFS

PEANUT HARVEST--A bumper yield was reported from 80,000 mu of peanuts in Sihong County of Jiangsu this year, with total output reaching 16 million jin, an 3-fold increase over 1979. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 13 Oct 80 OW]

COUNTY AFFORESTATION--As of now, Feng County, Jiangsu, has afforested 95,000 mu of land, planted 25 million trees on the "four sides," surrounded 980,000 mu of the 1.2 million mu of farmland with forests and interplanted grain with tong trees on 110,000 mu of land. Now 11.8 percent of the county is covered with forests. [Nanjing Jiangsu Provincial Service in Mandarin 2300 GMT 9 Oct 80 OW]

AUTUMN SOWING--Xinyi County plans to plant 850,000 mu of wheat, barley and naked barley and expand the area of green manure and rape by 420,000 mu this fall. So far, 175,000 mu of green manure and 55,000 mu of rape have been planted. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 7 Oct 80 OW]

INCOME FROM COMMUNE INDUSTRIES--This year Suzhou Prefecture of Jiangsu has decided to take 15 to 20 percent of the profits made by commune- and brigade-run industries and put it into the distribution funds of production teams so that the commune members may derive benefit directly from the development of these industries. During the first half of this year, the total output value and profits of these industries were both record highs. The output value was 1.613 billion yuan, an increase of 60.7 percent over the same period of last year, while their realized profit was 248.6 million yuan, up 69.1 percent from the comparable period of last year. [Nanjing XINHUA RIBAO in Chinese i3 Sep 80 p 1]

CSO: 4007

## LIBERALIZED POLICY PROMOTES SUGAR BEET CULTIVATION

Beijing RENMIN RIBAO in Chinese 5 Jul 80 p 2

[Article by Xinhuahe correspondent Su Wuchen [5685 0582 6591]: "Liberalization of Economic Policy in Jilin Promotes More Sugar Beet Cultivation. Linkage of Grain and Sugar and Division of Profits From Sugar Beet Processing Instituted"]

[Text] Jilin Province has acted realistically to liberalize economic policies and to institute a system linking grain and sugar and dividing profits from the processing of sugar beets to encourage communes, production brigades, and individual commune members in sugar beet producing areas to plant more sugar beets and care for them well.

By division of profits from the processing of sugar beets is meant that half of any profits realized by sugar refineries from the processing of sugar beets to produce sugar are to be returned to the sugar beet producing units (or individuals). Not included are aggregate used profits made by sugar refineries from the processing of raw sugar, alcohol, or monosodium glutamate. The linking of grain and sugar means that once the sugar beet producing units have fulfilled production quotas handed down by the state, for each additional 7 jin of production, the state will make an award sale of 1 jin of wheat. Following promulgation, this scheme was first tried out in the two counties of Nongan and Huaide, which account for one-third of the province's total output of sugar beets.

Last year Jilin Province liberalized economic policies, raised purchase prices, offered additional prices for excess production, readjusted base figures for state procurement of grain, and guaranteed food grain standards for commune members so that commune members in sugar beet producing areas would have more benefits and sugar beet production would grow. Last year per unit yields of sugar beets throughout the province were 29.4 percent higher than for the previous year, and the quantity purchased by the state increased by 23.4 percent. This heartening change made the Jilin Provincial CCP Committee realize that the greater the shortage of agricultural by-products, the greater the need for liberalization of policies. When the farmers have benefits, they have enthusiasm; production then develops, and the economy becomes lively. On the basis of this realization, the Provincial CCP Committee decided it would continue to carry out last year's sugar beet policies while liberalizing policies this year, instituting a linking of grain and sugar and a division of profits from the processing of sugar beets, thereby further arousing the enthusiasm of the farmers for growing sugar beets.

Following announcement of these two policies at the Jilin Provincial Sugar Beet Conference convened in March this year, cadres and commune members in sugar beet

growing areas welcomed it. According to statistics, the sugar beet area throughout Jilin Province amounts to 1.2 million mu this year, an increase of more than 400,000 mu over last year and a 20 percent increase over the original plan. Now seven sugar plants throughout the province have already signed contracts for the production and purchase of sugar beet production with more than 22,000 sugar beet production teams. The production teams guarantee a certain production area and output of sugar beets, and the sugar plants guarantee to follow government policy to purchase the sugar beets, to supply seeds and pesticides, and to send technical cadres to provide guidance in sugar beet production.

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CSO: 4007

JILIN

BRIEFS

PREFECTURE ANIMAL HUSBANDRY--Livestock production has reached a new high in Baicheng Prefecture, Jilin Province, this year. The total number of cattle and sheep in the prefecture has reached more than 1.405 million. Privately owned cattle and sheep in the prefecture now number more than 500,000, or over 35 percent of the total. [Beijing Domestic Service in Mandarin 0400 GMT 7 Oct 80]

JILIN AUTUMN HARVEST--By 12 October, over 52 million mu of various crops had been harvested in Jilin Province. This year's autumn crop has been harvested more quickly and efficiently than last year's. [SK201025 Changchun Jilin Provincial Service in Mandarin 1100 GMT 17 Oct 80]

CSO: 4007

BRIEFS

LIAONING VEGETABLE SUPPLY--The Liaoning Provincial People's Government has issued a circular on autumn vegetable procurement and supplies. It states: in spite of this year's reduction resulting from natural calamities, vegetable supplies will be guaranteed. The province has arranged to supply the markets with 1.5 billion jin radishes and cabbage, in order to ensure ample supplies, all collectives, including enterprises, plants and army units, must abide by the state policy. They are not permitted to purchase vegetables from production units in rural areas. Vegetable-growing units are not permitted to sell them either. One who violates this rule must be seriously dealt with. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 17 Oct 80]

FENCHENG TOBACCO--Fengcheng County in Liaoning Province has harvested 129,600 dan of tobacco, an increase of some 30,000 dan over that of the corresponding 1979 period. Fengcheng County has planted some 70,000 mu of tobacco this year--one third of the total acreage of tobacco fields in the province. Estimated profits are about 65 million yuan this year. It is planned that about 46,000 dan will be exported, from which 600,000 yuan will be earned. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 17 Oct 80]

LIAONING AUTUMN HARVEST--By 18 October, Liaoning Province had harvested 46 million mu of various crops, 95 percent of the total areas to be harvested. By now, over 2 billion jin of grain have been threshed and over 600,000 dan of unginned cotton have been gathered. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 20 Oct 80]

LIAONING MEAT SUPPLIES--After the readjustment of markets, Shenyang Municipality has improved meat supplies. Some 12 million tons of beef and mutton were sold during the period from January through September, an increase of 95.5 percent over that of the corresponding 1979 period. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 20 Oct 80]

CSO: 4007

MORE SUGAR BEETS SHOULD BE GROWN IN NEI MONGGOL

Beijing RENMIN RIBAO in Chinese 5 Jul 80 p 2

[Article by Xinhua社 correspondent Wang Wenliang [3769 2429 0081]: "Nei Monggol Should Make Use of It's Special Advantages for Growing Sugar Beets"]

[Text] Geographic and climatic conditions in the Nei Monggol Autonomous Region are exceptionally favorable for the growing of sugar beets. The sugar content of sugar beets produced here is higher than elsewhere in the country. Since every nationality began large area cultivation of sugar beets in 1953, abundant experiences have been accumulated in the growing, tending, and prevention of diseases and insect pests of sugar beets. Nevertheless, for many years sugar beet production in Nei Monggol has stagnated. Last year, the 760,000 mu sown to sugar beets amounted to only 1 percent of the total cultivated area.

The main reason that sugar beet production does not rise is poor handling of conflicts between grain and sugar production. Nei Monggol is presently not self-sufficient in grain production, and some people feel that once there is sufficient grain to eat, there will be time enough to talk about growing sugar beets. Still others ask whether you eat grain or sugar. It appears that if the food problem is to be solved, sugar beets will have to stand aside.

As a matter of fact, this is a lopsided view. They see only the aspect of mutual competition for land between grain and sugar without seeing the aspect of the mutual advancement of grain and sugar. Nei Monggol is a vast and thinly populated land where labor is in short supply. An average of 22 mu of land is cultivated by each working farmer in rural villages, and in some places, farmers work more than 50 mu of land. If agriculture is to develop on a large scale, mechanization will be required. But mechanization requires large amounts of capital, and where will the capital come from? Planting of more economic crops such as sugar beets is a good way to increase the accumulation of capital. A survey shows that were each commune and brigade to use 5 percent of its land for the growing of sugar beets, the income derived would amount to more than 20 percent of total agricultural income.

The role of greater cultivation of sugar beets in the promotion of grain production is also very great. For every ton of sugar beets produced, the heads, stems, tail ends of roots, and unused portions amounts to an additional ton of by-products. These by-products make a good hog feed. One ton of sugar beet by-products plus some other feed is sufficient to feed a large fat hog. For this reason, farmers in some sugar beet producing areas say that sugar is not all that comes from a sugar beet; there is also grain and meat to eat. This little rhyme expresses very well the dialectical relationship of the mutual advancement of grain and sugar.

in terms of making the most of the special economic advantages of the autonomous region and striving to get ideal economic benefits at the least possible cost, planting more sugar beets and producing more sugar in Nei Monggol makes since. At the present time, average per unit yields of grain in the autonomous region are only 136 jin. Until fundamental changes are made in production conditions, growth of grain production here will require a lot of effort, but if sugar beets were grown, per mu yields of 2,000 jin would be quite easy to achieve. The income from 2,000 jin of sugar beets could amount to more than 90 yuan. Figuring an average 8 jin of sugar beets to produce 1 jin of sugar, 2,000 jin of sugar beets will produce 250 jin of refined granulated sugar. The output value of 250 jin of granulated sugar and somewhat more than 100 jin of grain cannot be compared. Therefore, the growing of more sugar beets would be extremely beneficial to the country, to the collective, and to the individual.

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CBO: 4007

NEI MONGGOL

BRIEFS

NEI MONGGOL AFFORESTATION--Jirem league in Nei Monggol has made headway in afforestation. By now, areas around 2,380 of 3,637 primary and middle schools, 4 of 6 railway lines, 12 of 26 highways and about 23 percent of the rivers banks in the league have been afforested. Some reservoirs have also planted trees. Shelter forests cover more than 100,000 mu of land. [Hohhot Nei Monggol Regional Service in Mandarin 1100 GMT 16 Oct 80]

CSO: 4007

SHANDONG

BRIEFS

PIGSKIN PROCUREMENT--Jinan, 11 Oct (XINHUA)--In the past 2 years, Pingdu County, Shandong, procured some 238,000 sheets of pigskin annually. [Beijing XINHUA Domestic Service in Chinese 0117 GMT 11 Oct 80 OW]

SHANDONG COUNTY MUSHROOM PRODUCTION--Jinan, 16 Oct (XINHUA)--The people's air defense departments in Shandong's Yanzhou County are making use of underground air defense passages to grow edible fungi and mushrooms on a trial basis. They grow mushrooms on cottonseed cakes and, after 3 or 4 months, can collect some 30 jin from each square meter. Edible fungi are planted on tree branches, and each 100 jin of branches can yield 1 jin of dried edible fungi. [Beijing XINHUA Domestic Service in Chinese 0842 GMT 16 Oct 80]

CSO: 4007

## NEW VARIETIES OF LATE RICE APPRAISED

Shanghai SHANGHAI NONCYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 4, 5 Aug 80 pp 9-12

[Article from Grain Cultivation Laboratory, Crop Institute, Municipal Agricultural Academy: "Evaluation of a New Strain of Late Season Rice"]

[Text] The area in the Shanghai environs devoted to the cultivation of late rice accounts for 90 percent of the total area of grain fields, and it occupies a decisive position in grain production. Since Shanghai is located at the northern edge of the semi-tropics, seasonal scheduling for the three crop system is very tight; temperature changes in the weather during the growth stage for late rice seriously impair output. During the past 10 years, per mu yields have fluctuated from 512-732 jin, for an average 612 jin  $\pm$  69.4 jin, or a relative deviation of 11.3 percent and extreme variability in output. Therefore, we took the major representative varieties of late rice, together with strains we had produced, to conduct observations and study of their growth characteristics in the hope of mastering means critical for their cultivation in order both to promote consistently high yields and to offer data for reference in the breeding of varieties.

### Test Materials and Methods

There were 14 items of test materials divided into three groups according to their required period of growth. They were sown at different times, and all transplanted at the same time on 4 August, so that the time of harvest for all of them would generally coincide (Table 1). Experiments were jointly conducted by the test farm of our institute, the seed farm of the Huazao Commune, and the Hongwei Scientific and Technical Station of the Jiwang Commune. Seeds were provided by our laboratory. Specification for experiments and field care were completely identical. Unified standards were used to record developments in growth, and the taking of specimens for measurements was all done by our laboratory. Experiments were done according to conventional methods of growing sturdy seedlings at a density of 4 x 4 (cun). Each hole contained from 5 to 7 sprouts; basic fertility of the fields before

Table 1. Basic Facts About Test Materials Provided

	Variety of Material	Total Growth Period (days)	Amount of Seeds Sown (jin/mu)	Time of Sowing (month/day)
Early Ripening	Huxuan 19 (CK)	128	140	6/26
	76057	128	140	6/26
	1404-109	131	140	6/26
	75-1	127	140	6/26
	Liza 23*	108	20	7/12
Medium Ripening	Jianong 15 (CK)	133	120	6/22
	6366	137	120	6/22
	77005	137	120	6/22
	77007	136	120	6/22
Late Ripening	Nong hu No 6 (CK)	144	110	6/16
	Hunanwan**	142	110	6/16
	6507	142	110	6/16
	Jianong 762	142	110	6/16
	Jinong	142	110	6/16

\* Exceptionally early maturing strain hybrid fine variety

\*\* Mistakenly mimeographed as Huigeng 713.

planting was 30 dan per mu of composted pig manure, with topdressing of 50 jin of ammonium sulfate thereafter. Fertilizer applications were repeated three times in a random fashion, and control measures against disease and insects were taken three times on the plots, which had a net area of 3 li. The output for individual harvests from each plot was recorded.

#### Growth Characteristics of Late Rice

(1) Characteristics of Rice Plants: After late geng variety of late rice has been transplanted, the length of daily sunlight suffices its needs for a short period of sunlight daily. Since its vegetative growth period is shorter by 11 days than for single crop late rice, the height of plants is also noticeably shorter, generally 20 to 30 centimeters lower. Among the 14 test material items, short stem types less than 75 centimeters tall included 75-1 and 6366. Tall stem types taller than 85 centimeters included Nonghu No 6, Liza 23 and Jinong. The remainder were all medium stem types. (See Table 2)

Table 2. Late Rice Plant Heights

Plant Type and Height		Height (cm)
Short Stem Type	6366	60.1
	75-1	73.2
Medium Stem Type	6507	75.9
	Jianong 762	77.3
	7707	77.5
	Jianong 15	80.3
	1404-109	80.8
	Huxuan 19	80.9
	Hunanwan	81.6
	77005	83.1
	76057	84.3
High Stem Type	Jinong	89.9
	Nonghu No 6	91.0
	Liza 23	92.0

Growth of late rice in seedling beds was very rapid, but tillering was slow, becoming faster following jointing. In the seedling beds, seedlings grew at a rate of from 0.97 to 1.51 centimeters daily for an average 1.23 centimeters. Between the time of transplanting and the height of tillering, growth of late rice was extremely slow. Except for Liza 23, a hybrid rice that grew 1.07 centimeters daily, 5 varieties of the material grew less than 0.005 centimeters, and the other materials grew at a rate ranging from 0.10 to 0.44 centimeters. The overall average was one-fifth that in the seedling beds. Following jointing, the growth rate ranged from 0.33-1.37 centimeters, which was about 3 times the overall average for the tillering stage, and more than one-half that in the seedling bed stage.

Elongation of late rice produces five internodal segments, for the most part, with a minority of plants producing four or six segments. Various kinds of material fluctuated at from 4.4 to 5.7 for an average 4.9. Elongation to the first node at the base was the shortest, usually from 1.1 to 2.4 centimeters, with each segment becoming longer and longer, with the one just below the panicle being the longest. The weight of internodal segments is lighter for those on both ends and heavier for those in the middle. The first segment at the base is lightest in weight with the second lightest being either the one just below the panicle or the second one from the base. The second or third segments below the panicle are heaviest. The dry weight per unit of length of the internodal segments gives an idea of the toughness of the segments. The toughness is exactly the opposite of the situation

Table 3. Internodal Segment Data About Late Rice Varieties Materials

												(1) 单位长度干重(克/厘米)
品2) #	3) H19	76057	751	109	4) Liza 23	5) Jian 15	6) 6366	7) Nonghu No 6	8) Hunanwan	9) Jinong	10) Jianong 762	
10) 基部第一节	0.23	0.50	0.48	0.67	0.56	0.78	0.47	0.80	0.73	0.57	0.28	0.76
11) 第二节	0.23	0.31	0.35	0.24	0.40	0.33	0.24	0.19	0.28	0.25	0.45	0.54
12) 第三节	0.16	0.23	0.48	0.17	0.28	0.27	0.16	0.15	0.21	0.14	0.25	0.36
13) 第四节			0.35								0.19	0.24
14) 茎下第二节	0.18	0.17	0.27	0.14	0.16	0.21	0.14	0.12	0.18	0.16	0.16	0.19
15) 茎下节	0.049	0.070	0.097	0.056	0.055	0.080	0.067	0.062	0.079	0.075	0.081	0.012
16) 总段数	4.6	4.4	5.1	4.9	4.7	4.7	4.8	5.0	4.9	4.9	4.6	5.7

Key:

- |  |                                    |
|--|------------------------------------|
| 1) Dry weight per unit of length<br>(grams per centimeter) | 8) Jianong 762                     |
| 2) Variety   | 9) Jinong                          |
| 3) Huxuan 19   | 10) First segment at the base      |
| 4) Liza 23   | 11) Second segment                 |
| 5) Jianong 15  | 12) Third segment                  |
| 6) Nonghu No 6   | 13) Fourth segment                 |
| 7) Hunanwan  | 14) Second segment beneath panicle |
|  | 15) Segment beneath panicle        |
|  | 16) Number of segments             |

pertaining to the length of segments. The first segment at the base is toughest with each segment becoming progressively less so up the length of the stem. (Table 3) It has been generally suspected that the toughness of internodal segments is related to resistance to lodging. However, Huxuan 19, which is prone to lodging, has a rather low dry weight per unit of length of segments, while the dry weight is relatively high for Jianong 15, which is prone to lodging, but not high for 6366, which has good antilodging properties. It seems that resistance to lodging is also related to plant height and other characteristics.

This year the leaf area on single seedlings of the late rice was more than  $42 \text{ cm}^2$ , and on most varieties of the material it was more than  $50 \text{ square centimeters}$ . At the height of the tillering stage, leaf area for individual plants ranged from  $54.6$  to  $82.4 \text{ cm}^2$ , and during the booting stage, it ranged mostly from  $100$  to  $200 \text{ cm}^2$ . During the interval between transplanting the seedlings to the height of tillering, growth of leaf area was slowest. Except for Liza 23, a hybrid rice, only a minority of varieties had a daily growth per plant greater than  $1 \text{ cm}^2$ . Most were less than  $0.80 \text{ cm}^2$ . The minimum was only  $0.18 \text{ cm}^2$ . In the interval from jointing to booting, leaf area rapidly expanded. For most varieties, each plant increased by more than  $4 \text{ cm}^2$  daily. Expansion of leaf area and speed

of growth of rice plants coincided. This demonstrates that though the period of young panicle differentiation is an important reproductive growth stage, it is also an important stage for vigorous vegetative growth. Thickness of leaves for late rice at the stage of transplantation was 3.58 to 4.36 mg/cm<sup>2</sup>; during the height of tillering, it was 3.54 to 4.48 mg/cm<sup>2</sup>; during the booting stage it was 3.52 to 5.05 mg/cm<sup>2</sup>; during the in-the-milk stage, it was 3.80 to 5.20 mg/cm<sup>2</sup>, and during the ripening stage, boot leaves were 4.62 to 6.69 mg/cm<sup>2</sup>. Leaves that were young in age were tender and thin, and they became longer and thicker with leaf age, the boot leaves becoming thickest. Experiments have demonstrated that the photosynthesis effectiveness rate is higher for thick leaves than for thin ones. Therefore, the thickening of leaves as they are and their physiological function both increase progressively. As growth continues, the dry weight of leaves comes to occupy an increasing proportion of the dry weight of the material aboveground. During the transplantation stage, it fluctuated around 45.6 to 63.0 percent; during the height of the tillering stage, it ranged from 35.6 to 51.5 percent; during the booting stage, it was 32.7 to 43.4 percent; and following the in-the-milk stage, it was 11.9 to 17.4 percent. The reduction in the dry weight of the leaves resulted from the accumulation of material.

(2) Colony Development: The vegetative growth stage for field grown late rice is short, and the onset of tillering is quite concentrated. With transplantation taking place on 4 August, most varieties had begun to tiller by 14 August, and 27 August marked the zenith of tillering. Between 4 and 14 August, tillering was slight, fewer than 4,000 tillers being produced per mu per day. Of these, for more than half the varieties it was less than 1,000. Between 14 and 20 August, great disparity occurred in the increased tillering of different varieties. Both 75-1 and 6366 produced more than 20,000 tillers per mu per day, as did Nonghu No 6 and Hunanwan. Those increasing tillers by from 10,000 to 20,000 included 76057, Jianong 15, 7707, and 6507. The others produced less than 10,000. Of the 14 items of test materials, by 20 August, 10 had a total number of tillers per mu greater than effective panicles per mu, and 2 others were close. Therefore, the increase in tillering speed within a week from the beginning of tillering is a sign of the strength of the effective tillering rate. Between 20 and 27 August, the speed of tillering of the majority of varieties was less than 7,600 per mu per day, and virtually all were ineffective tillers. A characteristic change in tillering is that the onset of differentiation of the young panicles determines a turning from vegetative growth in the plant to reproductive growth. Therefore, for varieties bred in the Shanghai environs that have an increased tillering speed prior to 20 August, when care promotes a speedup in tillering before 20 August, a reduction in tillers occurs about 20 August, and this is of major significance for increases in the number of effective panicles for late rice. (See Table 4)

Table 4. Late Rice Varieties Colony Developments and Acceleration of Tillering (Units of 10,000 per day)

(1) 月/日	六月19	76067	169	761	5198 23	5198 16	6306	6364	7416	6507	5198 762	品种 N
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
8/ 4-14	0.40	-0.04	0.10	0.03	0.20	0.11	0.19	0.08	0.11	0.26	0.08	0.18
8/14-20	0.77	1.18	0.22	2.26	0.76	1.62	2.03	2.12	1.76	1.27	0.76	0.93
8/20-27	0.76	0	0.49	0.66	0.22	0.17	0.45	0	0.12	-0.43	1.40	0.20
8/27-9/1	0.22	0.38	-0.08	0	0	-0.30	0.22	0.22	0.08	0.38	0.60	0
9/ 1-6	-0.12	-0.60	-0.18	-0.84	0	-0.16	-0.68	-0.44	-1.16	-0.26	-0.42	0.80
9/ 6-15	0	0	0	-0.08	0	0	0.10	-0.26	-0.53	-0.28	-0.22	0.33

Key:

- |               |                |
|---------------|----------------|
| 1. Month/day  | 5. Nonghu No 6 |
| 2. Huxuan 19  | 6. Hunanwan    |
| 3. Liza 23    | 7. Jianong 762 |
| 4. Jianong 15 | 8. Jinong      |

(3) This year's coefficient for leaf area on late rice at the time of transplantation was between 1.35 and 1.87; at the height of tillering it was between 2.1 and 2.7; during the booting stage it was between 4.4 and 4.7; and at laqishu [5198 2601 3578] it was between 2.0 and 4.6. Between transplantation and the height of tillering, photosynthetic force was 18,133 to 36,467 m<sup>2</sup> per day. Between jointing and booting, it was 48,300 to 68,600 cm<sup>2</sup> per day. Between booting and lashu [5198 3578], it was 74,800 to 127,600 m<sup>2</sup> per day. The net photosynthesis production rate was maximum between the height of tillering and the booting stage. Every day, every square meter of leaf area synthesized between 3.61 and 5.45 grams of dry material. Between transplantation and the height of tillering, it was around 1.60 to 2.96 grams; and between booting and lashu it was mostly at 3.0 to 3.5 grams. The proportion of dry material synthesized between the time of full heading and full ripening fluctuated between 58.2 and 87.3 percent of the composition of output (Table 5). In general, the larger this proportion, the smaller the economic coefficient, and the smaller the amount of transfer to the grains of the material stored in the stems and the sheaths before full heading; however, the toughness of the stems and branches was stronger and the resistance to lodging greater. For example, prior to full heading, the material stored in the stems and sheaths of Jinong amounted to 13.6 percent of the composition of the output. When the amount of transferred material was small, the dry weight per unit of length of the first, second, and third segments was mostly in the first or second, and though the plants were tall, their lodging resistance was very strong. But the economic coefficient was only .45, and per mu yields were only 801.4 jin, 16.2 percent less output than for the control Nonghu No 6. By contrast, prior to completion of heading, the quantity

Table 5. Late Rice Varieties Material Production Situation

项 (1)	日 29	产 76.57	109	761	加农 33	加农 49	6366	农大 52	玉粳 713	6507	加农 762	加农 818
(9) 叶面系数	8/4(月/日) 8/24	1.35 2.1	2.27 3.2	1.82 2.1	1.80 2.3	0.42 2.3	1.87 2.0	1.87 2.0	1.60 2.7	1.85 2.1	1.57 2.4	1.59 2.3
	9/14	5.7	4.4	6.3	6.30	4.6	4.8	5.5	5.2	5.3	7.4	4.6
	10/17	4.1	4.6	4.6	3.6	2.0	2.0	4.2	3.6	4.4	4.2	3.6
	净光合生产率 (11)(克/m <sup>2</sup> ·天)	8/4—24 8/24—9/14 9/14—10/17	2.91 3.61 3.04	1.60 5.46 4.27	2.48 4.72 3.53	1.96 5.61 3.16	4.10 5.61 3.07	2.02 5.68 2.15	1.72 5.06 3.04	3.32 3.88 3.19	1.66 3.49 5.05	2.20 4.18 2.52
(12) 粮光合产物在产量中占%		67.7	78.6	59.0	87.3	/	67.5	64.4	68.0	75.8	62.3	58.5
(13) 经济系数		0.51	0.46	0.50	0.51	0.59	0.46	0.52	0.52	0.48	0.53	0.54

## Key:

- |                |   |
|----------------|---|
| 1. Item        | 8. Jinong   |
| 2. Huxuan 19   | 9. Leaf surface coefficient   |
| 3. Liza 23     | 10. Month/day   |
| 4. Jianong 15  | 11. Net photosynthetic production rate (grams/m <sup>2</sup> day)                       |
| 5. Nonghu No 6 | 12. Percentage of output of photosynthetically produced material following full heading |
| 6. Huigeng 713 |   |
| 7. Jianong 762 |   |

of material stored in the stems and sheaths of Huxuan 19 amounted to 32.3 percent of the composition of the output. The economic coefficient was 0.51, and the amount of transferred material greater. The dry weight per unit of length of the first, second, and third bottom segments was very low, the degree of dryness being in descending order. Plant heights were lower than those of Jinong by 9 centimeters, and the plants were very prone to lodging. In the case of low stem type 6366, however, though the amount of material stored in the stems and sheaths prior to full heading that was transferred was fairly great, amounting to 35.6 percent of the composition of output, the economic coefficient amounted to 0.52, and the toughness of segments was poor, the short stems were not prone to lodging, and output stood first among that of medium maturing series for a 19.9 percent increase over the control Jianong 15. Short-stem type varieties possess the characteristics of having a quite high economic coefficient while not being prone to lodging. In breeding work, emphasis on short stems is economically worthwhile.

(4) Composition of output. The vegetative growth period of late rice is short, so principal reliance must be placed on the number of panicles in order to get higher yields. Of the materials included in this year's experiments with late rice, the number of effective panicles per mu was more than 250,000 (the hybrid rice aside), and for most of the material the number was greater than 300,000. The total number of grains per

panicle was between 50 and 70 or more in most cases, and the per 1000 weight of grains was more than 25 to 26 grams in most cases. The early maturing control, Huxuan 19, had per mu yields of 830.0 jin, and 76057 had per mu yields of 961.1 jin, a 19.9 percent increased yield over the control. The late maturing control, Nonghu No 6, had per mu yields of 956.6 jin; and Hunanwan had per mu yields of 996.8 jin, a 4.2 percent increase over the control.

#### Conclusions

Late rice grown in the Shanghai environs is much affected by fluctuations in temperature. Meteorological data for the period 1873-1972 shows that beginning on 16 September, bouts with low temperatures begin. Prior to 20 September the damage rate from low temperatures for fully headed late rice is 16 percent. The rate is 27 percent for rice fully headed before 23 September. During the 1970's the rate was 30 percent, and before 23 September, it was 50 percent. The frequency of damage had increased strikingly. Consequently, in the process of breeding late rice varieties, the danger of low temperatures is a major factor requiring consideration. The results of this year's experiments show that 6366 has numerous effective panicles, a rather high economic coefficient, short stems, is not prone to lodging, has fairly high output, and is fairly tolerant of low temperatures. Its shortcoming is small panicles and a slow rate of growth of leaf area. During booting, 76057 showed vigorous photosynthesis, rapid coming into milk, and its growth stage was short, which is helpful in avoiding low temperature damage. Its shortcomings are lack of tolerance for fertilizer and proneness to drop its grain. However, following completion of heading, its resistance to lodging is better than that of Huxuan 19. Given moderate levels of fertilizer, output is rather high, and consistent yields may be obtained when it is used as the final rice crop. The late maturing Hunanwan, despite no strikingly increased output over the control, stood first in output among the 14 materials used in the test. Total number of grains per mu were highest, but it has the shortcoming of a long growth period. Whether or not it would produce high yields as a single crop late maturing variety awaits further test plantings.

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## EFFECT OF CLIMATE ON YIELDS OF LATE CROP RICE ANALYZED

Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 4, 5 Aug 80 pp 7-9

[Article by Gao Shixiu [7559 1102 4423], Agricultural Meteorology Office, Shanghai Municipal Meteorology Institute: "Analysis of Agricultural Climatic Conditions Affecting High Yields of Late Crop Rice"]

### [Text] 1. Quantitative Agricultural Climate Indicators Affecting High Yields

There are numerous factors that cause unpredictability in the output of the late rice crop in the Shanghai area. A look at the structure of output from the late rice crop during the past several years shows great variability in the number of effective panicles, the number of mature grains, and the per thousand weight of grains, and year to year differences have been fairly great. For example, the difference between 1974, the year of the greatest number of effective panicles, and 1977, the year when they were fewest, was 81,400 per mu. The difference per panicle in the number of mature grains was 9.07, and the difference in per thousand weight of grains was 2.21 grams. The reason for these differences is related to the weather conditions for different growing seasons for the late rice crop. For example, the main reason for the reduced output in 1974 was a high rate of empty husks, meaning a reduced number of mature grains per panicle. The reason was that during the meiosis stage (16 September), low temperatures occurred (the lowest being 15.1°C); in 1975, the main reason for reduced output was a low per thousand grain weight, the result of high temperature and a large amount of rain during the period of booting and flowering, which brought on damage from diseases and insect pests as well as lodging during the late stage. In 1977, the main reason for reduced output was a lesser number of effective panicles, the result of continuous low temperatures following transplanting, poor tillering, and noticeably reduced numbers of tillers. The crucial period of growth when unfavorable climatic conditions can impair high output of late rice is mostly in the early stage, from booting to being in the milk. Cold damage can result from low temperatures, or high temperatures and high moisture may occasion insect damage. Low temperatures and high moisture may occasion disease damage. Second in

importance is reflected low temperatures during the tillering stage. Agricultural meteorological experiments conducted since 1973 show that there are two periods when late rice can suffer cold damage from low temperatures. One is during the meiosis stage of the pollen mother cell. It is exceptionally sensitive to temperature at this time, and if temperatures as low as 15°C are encountered, the pollen will either stop development or its development will be impaired to the extent of losing its ability to germinate, and thus husks devoid of grain will be formed. The second period is during the panicle formation and flowering stage. For low temperature indicators causing cold damage, see Table 1. When any one of the conditions listed pertains, the cold damage will be most noticeable. The lower the temperature and the longer the low temperature continues, the more serious the damage.

Table 1. Low Temperature Indicators for Cold Damage During the Flowering Stage for Late Rice

No.	Average Temperature	Continuous Number of days	Maximum Temperature	Continuous Number of Days
1	19.5 - 20.4°C	3 days or more	less than 23.4°C	3 days or more
2	18.5 - 19.4°C	3 days or more	less than 23.4°C	2 days
3	below 18.4°C	3 days or more		

In order to more fully understand the quantitative agricultural climatic indicators affecting high yields of late rice, we used per mu yields in Shanghai over the years to analyze the relationship between various climatic conditions and output during various stages of growth. From this effort was derived the preliminary quantitative indicators for agricultural climate at crucial growth stages that results in reduced yields of late rice over large areas. (See Table 2) Using the climatic conditions over the years during the principal growth stages of late rice, matching them with the quantitative indicators of damage shown in Table 2, the annual extent of impairment of the late rice by unfavorable climatic conditions may be determined. From the size of the overall annual climatic impairment index can be determined how good the harvest was. The higher the percentage of the overall impairment index, the more serious the degree of impairment that year from unfavorable climatic conditions, and the lower the output. Conversely, the smaller the percentage, the less the extent of impairment from unfavorable climate indicated and the higher the output. In Figure 1, the percentage of rise and fall over the years in per mu yields and overall climatic impairment is virtually the same. This shows that the quantitative agricultural climate indicators causing damage during critical stages of growth, as presented in Table 2, are the principal unfavorable climatic factors impairing high yields from late rice in Shanghai (Figure 1).

Table 2. Agricultural Climate Impairment Indicators for Late Rice

				(4)
				Key:
(5)	(6)	6月27日至7月上旬 雨量大于200毫米。(7)		1. Growth stage
雨量	(8)	7月平均气温低于26.0°C (9)		2. Climatic conditions
	(10)	(11)	<26.0°C	3. Agricultural climate impairment indicators
气温	气温	气温	10	4. Impairment Index (percent)
	(12)	气温	26.0~27.0°C	5. Sowing of seeds and sprouting period
	(13)	(14)	气温<5.0°C	6. Many heavy rains at time of sowing of seeds
气温	气温	(15)	10	7. Total rainfall between last 10 days of June and first 10 days of July was more than 200 mm
	(16)	(17)	低温开始 期出现在9 月23日或以 后(18)	8. Low temperatures during sprouting period
气温	气温		气温	9. Average temperatures during July were below 26.0°C (lower than 1.5°C than most years)
			(20)	10. Transplanting and tillering years
气温			气温	11. Continuous low temperatures
			(21)	12. Average temperatures during mid-August and last 10 days of August
冷害				13. Meiosis stage
			(22)	14. Cold damage from low temperatures
害			气温	15. Lowest temperature during middle of September < 15.4°C (1 day)
			(23)	16. Panicle formation and flowering stage
害				17. Autumn cold damage from low temperatures indicators (see Table 1)
	(27)	(28)	9月下旬至10月上旬 气温<22°C	24. Beginning of low temperature period 27 September to 1 October. Additionally, from November of the previous year to last 10 days of May > 3°C Accumulated temperature less than 1360°C
开花	开花	开花	气温<22°C 100毫米(29)	25. Most counties experience low temperatures
结实率	结实率	结实率	气温<22°C	26. Some counties experience low temperatures
			9月下旬至10月上旬 雨量50~100毫米(32)	

18. Onset of low temperatures occurs prior to 23 September
19. Most counties experience low temperatures
20. Some counties experience low temperatures
21. Onset of low temperatures occurs before 24 and 26 September
22. Most counties experience low temperatures
23. Some counties experience low temperatures

1. Growth stage
2. Climatic conditions
3. Agricultural climate impairment indicators
4. Impairment Index (percent)
5. Sowing of seeds and sprouting period
6. Many heavy rains at time of sowing of seeds
7. Total rainfall between last 10 days of June and first 10 days of July was more than 200 mm
8. Low temperatures during sprouting period
9. Average temperatures during July were below 26.0°C (lower than 1.5°C than most years)
10. Transplanting and tillering years
11. Continuous low temperatures
12. Average temperatures during mid-August and last 10 days of August
13. Meiosis stage
14. Cold damage from low temperatures
15. Lowest temperature during middle of September < 15.4°C (1 day)
16. Panicle formation and flowering stage
17. Autumn cold damage from low temperatures indicators (see Table 1)

24. Beginning of low temperature period 27 September to 1 October. Additionally, from November of the previous year to last 10 days of May > 3°C Accumulated temperature less than 1360°C
25. Most counties experience low temperatures
26. Some counties experience low temperatures

[key continued next page]

[Key to Table 2 - continued]

27. From flowering to in-the-milk period
28. High temperatures and high humidity or low temperature and high humidity
29. Total rainfall greater than 100 mm between first 10 days of September and last 10 days of October.
30. Average temperatures during first 10 days of October greater than 22°C
31. Average temperatures during first 10 days of October less than 22°C
32. Total rainfall between first 10 days in September and last 10 days in October 50 - 1000 mm.

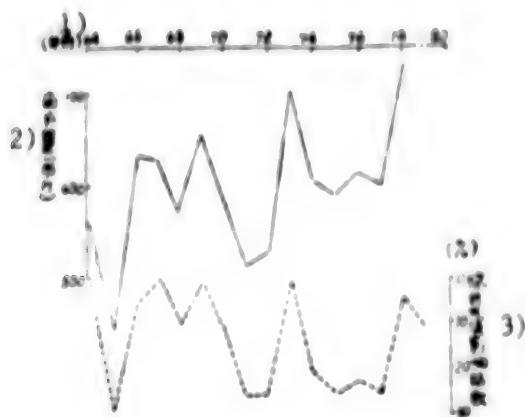


Figure 1. Correlation between per mu output and overall climate impairment index for late rice

Key: Year

1. Year
2. Per mu yields (shijin)
3. (percent) Overall climatic impairment index

## 2. Agricultural Climatic Conditions During the Growth Period for Late Rice in 1979

Accumulated temperatures during 1979 tended to be low. Between July and October, effective accumulated temperatures amounted to 1742°C for days over 10°C. Total number of hours of sunlight were 861. Total rainfall was 259 millimeters. Accumulated temperatures were 29°C less than the annual average; sunshine was 58 hours more than the annual average, and rainfall was 224 millimeters less than in average years. As compared with the same period in 1978, accumulated temperatures were lower by 114°C; sunlight was 67 hours less; and rainfall was 56 millimeters more. Overall, agricultural climatic conditions were not as favorable as during 1978.

(1) Sowing of seeds and sprouting occurred during the rainy season when there was less sunshine. Between the last 10 days of June and the first 10 days of July, there were only 37 hours of sunshine, 69 hours less than the annual average for the same period, and less than any year since Liberation. In midsummer, the weather was clear and hot. Between the first 10 days in July and the first 10 days in August, effective accumulated temperatures for days above 10°C amounted to 583°C, higher by 32°C and 8°C respectively as compared with the annual average and with the same period in 1978. Sunshine totaled 281 hours, 30 hours and 25 hours more respectively than the annual average and the 1978 average for the same period. Weather conditions during the sprouting stage were quite favorable.

(2) After the seedlings were transplanted they were damaged by two typhoons and cold air. During the last 10 days of August and the first 10 days of September, temperatures averaged 25.8°C and 23.2°C respectively, lower by 1-2°C than the annual average, and lower by 3-4°C than for the same period in 1978. There were numerous overcast and rainy days during this period, with low temperatures that impaired tillering. The zenith of tillering was delayed. Added to this was the late arrival of the "Autumn Equinox," and the effects of cold air drove temperatures down quickly in parts of this city. On 24 September began 3 continuous days when average temperatures fell to around 19°C, of which maximum temperatures for 2 days in a row fell below 23°C. Some fields suffered cold damage, with the result that the empty husk rate was higher than in 1978.

(3) During the flowering and in the milk stage, the weather was continuously fine with little rain. Sunlight was sufficient, but daily temperatures were off. During the first 10 days of October, temperatures averaged 11.6°C. While temperatures were low, the climate was also dry and the in-the-milk stage advanced slowly. During the first 10 days of October, for instance, the lowest temperature averaged 2.5°C less than for the same period in average years. The average relative humidity for each 10-day period was 13 percent less than for the same period in average years. A check conducted on 18 October showed the per 1000 weight of grains to be only 16.38 grams, with an annual daily increase in weight of 0.67 grams.

### 3. Predicting Output on the Basis of Agricultural Climatic Conditions

The three basic factors making for agricultural crop output were used to make quantitative calculations. One was consideration of the annual average per mu output resulting from the local natural conditions, the economic foundation, levels of fertilizer and technical conditions. Second was an analysis of reforms to the system of cultivation, and improvements in varieties, and scientific farming for average annual increases in production commensurate with speed of development of productivity. Third was analysis of the extent of impairment to output caused

by the multiple unfavorable climatic conditions. As a basis for statistical analysis, the following formula was used:  $D = Y - YX + Z$ . In the formula D stands for theoretical per mu output; Y stands for average per mu output in an average year; and Z stands for increased value in an average year. X is the overall climatic impairment index. Statistics show that between 1964 and 1978, average per mu output for late rice was 597 jin. During this 15-year period, the increased value of per mu yields of late rice was 172 jin, and the 1979 overall impairment index was 12 percent; therefore, the theoretical per mu yield for late rice in 1979 will be  $597 - (597 \times 0.12) + 172 = 697$  jin. It is estimated that yields will be about 35 jin less than for 1978. A comparison of theoretical and actual per mu yields of late rice over the years shows a virtual identical trend for the two. (See Figure 2) The discrepancy was  $\pm 20$  jin for 80 percent of the years, and  $\pm 10$  jin for 60 percent of the years for a good correlation.

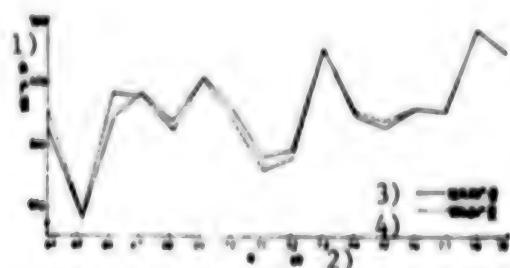


Figure 2. Showing correlation between theoretical and actual output for late rice

Key:

1. Per mu yields
2. Year
3. Theoretical per mu yields
4. Actual per mu yields

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BRIEFS

TRAINING OF RURAL CADRES--Since the holding of the Third Plenary Session of the current party Central Committee, enrollment of rural cadres in Sichuan in various types of training classes to study rural economic management and agricultural technology has exceeded 1.2 million. Last year such classes were established in 14 counties, and the first 3,400 graduates were production brigade party branch secretaries and brigade leaders. This year 40 counties have set up such classes to train some 10,000 cadres. According to a decision made by the provincial party committee, short-term technical classes will also be set up to train cadres above the level of work-team leaders. [Chengdu SICHUAN RIBAO in Chinese 17 Aug 80 p 1]

CROP PROTECTION STRENGTHENED--By the end of July, 95 communes in Wenjiang Prefecture of Sichuan had set up plant protection stations or companies to control harmful insects. These stations or companies have 9,830 plant protection workers, who are also commune members, and more than 3,000 mechanized insecticide sprayers ("East is Red, model 18"), operated by some 6,000 trained operators. Thus far they have sprayed more than 2.7 million mu of paddy fields. [Chengdu SICHUAN RIBAO in Chinese 18 Aug 80 p 1]

RATOONING RICE--In the past 3 years, a production brigade in Hechuan County of Sichuan had been experimenting with ratooning hybrid rice plants. After summing up experience, it has recently decided to keep more such plants on 67 percent of its hybrid rice fields and strive for higher per-mu yield through better field management to encourage the growth of new shoots from the old roots. Plans for keeping ratooning plants on 340 mu of hybrid rice have already been made. [Chengdu SICHUAN RIBAO in Chinese 14 Aug 80 p 2]

WATER CONSERVANCY PROJECTS--Construction of a large number of water conservancy projects has helped increase the irrigated area in Sichuan from some 8 million mu before liberation to more than 44 million mu at the present. The management and utilization of these projects also have improved, and the potential for further improvements is still very great. Last year, the total volume of water stored in these projects throughout the province exceeded 8.6 billion cubic meters, or was nearly twice that of the previous year. As a result, the province is able to expand its paddy rice area by more than 1.6 million mu this year. Income from these projects and the ability of these projects to meet management expenditures have also improved over those of last year. [Chengdu SICHUAN RIBAO in Chinese 14 Aug 80 p 1]

RURAL ENERGY INCREASED—According to statistics, 205 small newly built hydroelectric stations were commissioned in rural areas of Sichuan during the first half of this year. These stations are equipped with a total of 286 power generating units with a total capacity exceeding 51,000 kilowatts, an increase of 89.9 percent over that installed in the same period of last year. The annual plan for the current year calls for the construction of new stations with a total capacity of 100,000 kilowatts. Additional stations now under construction are capable of generating 70,000 kilowatts, and, therefore, this year's annual plan will be overfulfilled. Moreover, 2,390.8 kilometers of high-tension powerlines were installed during the first half of this year.  
[Chengdu SICHUAN RIBAO in Chinese 22 Aug 80 p 1]

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## MEASURES TO ENRICH RURAL AREAS ADOPTED

Beijing RENMIN RIBAO in Chinese 10 Aug 80 p 1

[Article by XINHUASHE correspondent Wang Qinghai [3769 7230 3189]: "Make the Most of Special Local Advantages Permitting All Nationalities in Yunnan To Prosper With All Possible Speed."]

[Text] Following investigation and study, the Yunnan Provincial Party Committee recently decided to continue the emancipation of thinking, to liberalize policies, to make the most of the special economic advantages of the province, and to enliven the economy so as to fully arouse the enthusiasm of cadres and the masses to make all nationalities in the province prosperous within the shortest possible time.

1. Readjust policies regulating state purchases of grain, in order to reduce the burden on the masses. During 1979, state grain procurement quotas were reduced throughout the province, and some poor brigades either had their farm taxes reduced or were exempted from payment. This move substantially solved the problem of excessive burdens. The basic figure for state purchases of grain that resulted from this readjustment has been guaranteed to remain unchanged for the next 4 years. In addition, a continued readjustment of state procurement quotas will be made for a minority of production teams.

2. Establish and perfect totally flexible and varied systems of responsibility for production. While adhering to socialist collective ownership and distribution according to work, whatever methods are best able to arouse the enthusiasm of the masses and are most beneficial to the development of production should be adopted.

In border areas and in high, cold, impoverished mountain areas, where dwellings are dispersed, the population occupying vast lands is sparse, the economy is backward, and life is poor, a system whereby contracts may be instituted with individual households with or without raising the acreage issue.

3. Develop mountain regions and development of the forestry industry, and institute rights of ownership in mountain forests. In collectively owned forests where there are few or no production teams, a portion of the mountain wilds may be designated as state-owned forests and turned over to brigades for operation, and once the forestry rights have been so designated, a formal license will be issued. Destruction of forests and the opening up of wastelands shall be forbidden.

Adopt active measures for a satisfactory solution of the fuel problem. Reasonable cutting of timber can be permitted, provided the ecological balance is maintained.

4. Vigorously support the development of economic and cultural endeavors of minority nationalities in order to bring about a rapid transformation of impoverished and backward border nationalities areas.

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YUNNAN

BRIEFS

AGRICULTURAL FIGURES--Dry land accounts for two-thirds of the total arable land in Yunnan, but output from this land makes up less than one-half of the total grain output. Of the more than 20 million mu of dry land, red soil accounts for more than 15 million mu. At present grain yields per mu of dry land in mountainous areas are from 300 to 400 jin. Now in Yunnan there are 15 million mu of ricefields of which approximately 10 million mu have guaranteed irrigation. At present the sown wheat area in Yunnan is nearly 10 million mu, with an average yield of less than 200 jin. Nearly 5 million mu of wheat is irrigated. [Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 3, 25 May 80 p 2]

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ZHEJIANG

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Agriculture

AUTHOR: HU Bingfang [5170 4426 2455]

ORG: None

TITLE: "The Application of the Principle of Hard and Soft Acids and Bases to the Chemistry of Phosphoric Esters"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 1-12

TEXT OF ENGLISH ABSTRACT: According to Pearson's concept, there are two broad categories of both acids (Lewis) and bases (Lewis) which can be termed hard and soft. The present paper shows how this concept can be applied satisfactorily to the chemical reactivity of kinds of bonds, and to the selectivity of certain groups of phosphoric esters, especially in the case of thiophosphoric esters. The explanation and discussion dealing with the alkylation of thiourea, the catalyzed isomerization of thiophosphoric esters and the anomalous reaction of benzyl alcohol with phosphorus pentasulfide are made on the HSAB terms. A postulated mechanism of the catalytic role of tertiary amine in the preparation of diethyldithiophosphoric ester and some critical comments on the reaction of

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 1-12]

phosphoryl halide with dialkyldithiophosphoric ester are given in the light of the same principle. This is the first discussion of the above-mentioned and some other data.

AUTHOR: LI Hlun [2621 1322 0243]  
ZHU Tongxia [2612 1749 7209]  
ZHANG Chi [1728 4654]  
LI Baoren [2621 1405 0088]  
DENG Zepei [6772 3419 3099]  
LI Yongsheng [2621 3057 3932]  
MENG Fanjing [1322 4907 7234]

ORG: LI Hlun, ZHU and ZHANG all of the Department of Plant Protection;  
LI Baoren, DENG and LI Yongsheng all of the Department of Veterinary Science;  
MENG of the Department of Agronomy

TITLE: "Studies on Zearalenone"

SOURCE: BeiJing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] [in Chinese No 1, Apr 80 pp 13-28]

TEX OF ENGLISH ABSTRACT: A sterotrophic substance was extracted in crystalline form from the culture of Fusarium roseum 'graminearum' strain BAU-28, which was isolated from infected grains of corn harvested in the western suburb of Beijing. According to its melting point, ultraviolet and infrared spectra and other properties, it was identified as Zearalenone. About 1.4 grams of zearalenone was extracted from a culture of BAU-28 growing on a medium made from 1 kg

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 13-28]

of rice. The conditions for biosynthesis of zearalenone and the method of extraction and purification as well as its biological activity are described in this paper.

The experimental data showed that zearalenone stimulated the growth of the uterus of the white mouse and the growth of the Beijing duck significantly. The average uterine weight of young female mice treated with zearalenone by subcutaneous injection increased four-five fold in four days as compared with the control. The average body weight of Beijing ducks fed with crystalline zearalenone, at the beginning of forced feeding, in gelatin capsules at a rate of 0.7 mg/day, was about 16.1 percent ( $P < 0.01$ ) heavier than that of the control in 10 days.

It is interesting to note that a zearalenone-like substance was also found in the growing points of vernalized winter wheat seedlings. This substance has the same R<sub>f</sub> value and fluorescence as that of the zearalenone on a silica gel thin layer chromatogram. However, the winter wheat treated by soaking seeds in a solution of zearalenone, 100 ppm dissolved in 0.5 percent sodium bicarbonate aqueous solution for about two days at room temperature, did not eat when it was planted in either a greenhouse or in the field at normal temperatures under long

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 13-28]

day conditions, though the growing points had developed into double ridges (spikelet primordia). On the other hand, the spring wheat ('Potam' Mexican variety) treated with the same concentration of zearalenone eared about five days earlier than did the control. Further investigations on the effectiveness of zearalenone on the growth and development of wheat are still in progress.

AUTHOR: WU Zhongxian [0702 0112 6343]

ORG.: None

TITLE: "Estimation of Genetic Value on the Basis of Various Combinations of Pedigree, Sibs and Progeny for Sex-Limited Quantitative Characteristics"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 29-35

TEXT OF ENGLISH ABSTRACT: This paper is an extension of the work summarized in the author's book "Statistical Genetics." In that book were collected all the formulae on the estimation of genetic value for two generations of pedigree; one generation of pedigree and full and half sibs, paternal and maternal; and sibs and progeny without values for parents or grandparents. Since for sex-limited quantitative characteristics, e.g., milk or egg production, only two grandparents and one parent provide any data, and these plus full and half sibs and progeny total only six variables, it is considered worthwhile to work out the formulae required for different combinations of these relatives to facilitate the estimation of genetic value for use as an index for the selection of sires. Due to considerations of space, formulae for more than four variables are not presented since it has recently been discovered that by an appropriate

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 29-35]

transformation of the formulae could be derived by a method which reduces the labor 20-30-fold, the procedure to be published in a forthcoming paper.

AUTHORS: XU Xudan [6079 2485 2481]  
LOU Chenghou [1236 2052 0683]

ORG: Both of the Physiological Laboratory, Beijing Agricultural University  
and Henan Research Institute of Biology

TITLE: "Presence of Roots--A Prerequisite for Normal Function of Stomata on  
Sweet Potato Leaves"\*

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS  
PEKINENSIS] in Chinese No 1, Apr 80 pp 37-45

TEXT OF ENGLISH ABSTRACT: A single leaf or a stem segment bearing a leaf was detached from the sweet potato plant (*Ipomoea batatas*) and its lower end immersed in distilled water. The transpiration rate (grams of water lost/hr/ $m^2$ ) of the detached leaf was measured at regular intervals on successive days. On the first day it was, in general, slightly higher than that of the leaf on the intact plant. Two days later the rate rapidly declined to one-tenth of the original and was maintained at that low level for several consecutive days. Porometer and stomatal aperture measurements revealed that the decline was primarily due to the closure of stomata on the leaf. The decline could not be attributed to the abolition of root pressure or to physical obstructions at the cut and caused by local secretion or bacterial infection.

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 37-45]

As adventitious roots began to establish themselves on the stem or petiole, the transpiration rose accordingly toward its original level. At the same time, stomata resumed their normal function. If the newly formed roots were cut off, the stomata closed again and transpiration rapidly declined. An increase in transpiration was not the result of reinforcement of water absorption by newly formed roots, for the same rise persisted even if the roots were suspended in moist air and were incapable of absorbing water directly.

When kinetin, auxin or giberellin were applied separately to the leaves which had been detached three days before with their transpiration having already fallen to a low level, none of the three hormones had any favorable effect on leaf transpiration.

A plausible explanation of the experimental results is that the root system of the sweet potato is capable of supplying the leaf with some physiologically-active substance which is a prerequisite for normal function of the stomata. This substance can be stored temporarily in the leaf as well as in the stem as is evidenced by the fact that the longer the stem segment attached to the leaf, the slower the decline in leaf transpiration.

Though kinetin has been especially known for its enhancing effect on the stomatal

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 37-45]

opening, it is ineffective, when applied alone, in restoring the normal function of the stomata on detached leaves of the sweet potato. Classification of the chemical constitution of the substance concerned requires further investigation.

\* Most of the experimental results were obtained in the years 1964-1966, and supplementary studies on plant hormone effects were carried out in 1979.

AUTHOR: ZHENG Piya [6774 0012 1031]

ORG: None

TITLE: "On the Biological Characteristics of Summer Corn Cultivar 'Beijing Yellow 113'"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAES UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 47-56

TEXT OF ENGLISH ABSTRACT: This paper deals with some biological characteristics of the summer corn cultivar "Beijing yellow 113" grown in Beijing during the year 1975. The growing duration of this hybrid corn is about 90 days from seedling to maturity, with a total leaf number of about 16 in most cases. Its development proceeds at a moderate rate and does not show maturity in the middle of September when the atmospheric low temperature drops below 15°C. The leaf blade on the node where the ear emergence is the longest is also the leaf of maximum size. The longest leaf sheath is on the lower leaf, emerging from the node to which the ear is attached. Just below the tassel the internode is the longest. During the ontogenesis, eight layers of root emerge; those successively emerging have a total of 60 roots. Most penetrate deeply into the soil and the aerial root system is confined to one layer only. Concerning the function of the leaves, this hybrid corn often leaves eight green leaves before

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 47-56]

being harvested. These are mainly leaves above the ear and a few just below it. It differs slightly from spring corn in that the grain filling of summer corn continues until harvest, the dry weight accumulating accordingly.

For cultural practice, the leaves may be divided into three groups which relate to the growth and development of the root, stem plus leaves, ear and tassel, and grain. Emphasis is given to the control of the distribution of the assimilation at different stages and some morphological parameters are given so as to make growth of different organs harmonize for obtaining maximum yield.

AUTHOR: MI Jingjiu [4717 2529 0046]  
CHEN Dexin [7115 1795 9515]  
LIANG Qiyo [2733 0796 1031]

ORG: None

TITLE: "The Effect of Different Pollination Methods and Parent Combinations on the Hybridization between Winter Wheat and Rye"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAES UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 57-68

TEXT OF ENGLISH ABSTRACT: 1. When wheat varieties were crossed with rye, three methods were used: pollination without emasculation, pollination after emasculation without bagging and ordinary pollination with emasculation. When the first two methods were used, those wheat varieties easily crossed with rye could obtain a high percentage of hybrid seed. It was easy to distinguish the true hybrid seed from the false one according to the kernel type and kernel color. Hence, the method of pollination without emasculation is valuable for use in hybridization between wheat and rye.  
2. When the method of pollination without emasculation was used, those wheat varieties not easily crossed with rye produced a large proportion of false hybrid seed. A small amount of true hybrid seed, however, could be obtained

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 57-68]

through this method.

3. The germination potential and germination percentage of the hybrid seed of triticale F<sub>0</sub> was prominently lower than that of its parents.
4. When routine pollination after emasculation was practiced, all wheat varieties easily crossed with rye possessed high germination potential and germination percentage in their F<sub>0</sub> hybrid. Therefore, the percentage of seed setting was parallel with germination potential and germination percentage.
5. The method of pollination after emasculation without bagging, and especially the method of pollination without emasculation, conspicuously increased the germination potential and germination percentage of the normal and shrunken hybrid seeds. This was especially true for those combinations possessing low germination potential and germination percentage. This, in turn, depended to a large extent upon the greatly reduced percentage of ungerminated seeds.
6. The method of pollination without emasculation was compared to the routine method of pollination after emasculation and there was no significant difference between the two in respect to natural seed setting percentage and seed plumpness of F<sub>1</sub>.
7. During the germination of F<sub>0</sub> seeds, the phenomenon of abnormal germination was a common occurrence, but the percentage of abnormality was not high, and some of the abnormal seedlings were viable.

AUTHOR: ZHOU Changjiu [0719 7022 0036]

ORG: None

TITLE: "A Preliminary Study on the Isozymes of Several Species of Cruciferae"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAES UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 69-74

TEXT OF ENGLISH ABSTRACT: Peroxidase and esterase isozymic patterns revealed by polyacrylamide gel electrophoresis were studied in some varieties of cabbage (*Brassica pekinensis* Rupr.), Indian mustard (*Brassica juncea* Coss.) and radish (*Raphanus sativus* L.). Although some common characteristics were observed in the enzymograms of the three species investigated, more similarities in isozymic patterns for each of the enzymes studied were revealed within the same genus (between cabbage and Indian mustard) and especially within the same species (among different varieties of radish).

Five to nine bands of esterase were observed in each of the seven varieties of radish. The zymograms of these varieties were tentatively classified into four types.

AUTHOR: XU Shaoying [1776 4801 3379]

XU Youyu [6079 1635 3768]

SUN Wenbin [1327 2429 1755]

et al

ORG: None

TITLE: "Chemical Thinning of Apples: The Thinning Effect of Sevin and Naphthalene Acetic Acid (NAA) of 'Golden Delicious' and 'Ralls'"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAES UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 75-82

TEXT OF ENGLISH ABSTRACT: In 1978, sevin, NAA and mixed sprays of these two fruit thinners were tested for their effectiveness in thinning excess fruits of "Golden Delicious" and "Ralls," which are two of the most commonly grown apple cultivars in the apple regions of China. Previous experiments carried out in 1976 and 1977 indicated that 1000 ppm sevin and 30 ppm NAA applied two weeks after full bloom gave satisfactory thinning to "Golden Delicious" and "Jonathan," but were ineffective with "Ralls."

The results obtained in the 1978 experiments showed that sevin at the rate of 2000 ppm and NAA at the rates of 10, 20 and 40 ppm all significantly thinned

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 1, Apr 80 pp 75-82]

"Golden Delicious," the degree of thinning being approximately the same as conventional hand thinning. Mixed sprays of 10 ppm NAA plus 1000 ppm sevin, though lower in concentration than when these two chemicals were applied separately, also resulted in satisfactory thinning of "Golden Delicious." However, with "Ralls," sevin and NAA applied either separately or mixed failed to thin. The surfactant "6501" was added to all spray solutions and the trees were sprayed two weeks after full bloom in all treatments.

The thinning effect of sevin was evident one week after spraying, while that of NAA did not show clearly until the third week after spraying. Fruit size and weight of "Golden Delicious" were enhanced in all the treatments with these two fruit thinners. Yield per tree in 1978 and 1979 (not chemically thinned) showed that biennial bearing was markedly ameliorated.

NAA at the rate of 40 ppm produced a temporary inhibiting effect on the growth of young fruits. Except for this, no phytotoxic effects were observed.

AUTHOR: GUAN Zhihe [4619 5268 0735]  
WANG Shu [3769 2885]

ORG: GUAN of the Plant Protection Department, Beijing Agricultural University; WANG of the Science and Technology Office, Tianjin Agriculture and Forestry Bureau

TITLE: "The Influence of Aphid Saliva on the Infectivity of TpMV on Chinese Cabbage"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTRAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 83-85

TEXT OF ENGLISH ABSTRACT: The present study was carried out in Beijing in 1965. The turnip aphid, Lipaphis ervsimi, and peach aphid, Myzus persicae, were used for their head-thorax complex which carried the salivary glands, and these were homologized with Chinese cabbage leaves infected with TpMV. A non-aphid sample was used as the control. The homologized juices were picked up and inoculated by puncturing needles to healthy seedlings of Chinese cabbage. The results indicated that saliva from both aphid species promoted the infectivity of TpMV instead of inhibiting it, and the efficiencies shown were more significant in turnip aphids than in peach aphids. The conclusive results are discussed.

AUTHOR: YU Chuan [0060 5307]  
ZHANG Kefia [1728 0344 1367]  
LIU Gang [7120 6921]  
et al

ORG: None

TITLE: "The Effects of Laser-Acupuncture Stimulus on the Threshold of Pain in Animals"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 1, Apr 80 pp 103-108

TEXT OF ENGLISH ABSTRACT: 1. The laser-acupuncture stimulus may increase the threshold of pain significantly in rabbits, pigs, sheep and rats, so that certain evidence may be provided for its clinical application.  
2. Naloxone has an antagonistic action on the increasing of the threshold of pain in rabbits and rats caused by laser-acupuncture stimulus.

AUTHOR: LI Jilun [2621 1322 0243]  
WU Baihe [0702 2672 0735]  
CAO Zengliang [2580 1073 5328]

ORG: None

TITLE: "Studies on the Nitrogen Fixation by Free-Living Rhizobium sp. Cowpea Strains 1003 and 32HI"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 1-9

TEXT OF ENGLISH ABSTRACT: 1. A simple method for detecting nitrogenase activity of free-living Rhizobium sp. cowpea strain 1003 on a modified yeast mannitol-agar (YMA) is herein described. In addition to the original compounds of YMA, the modified YMA medium contains 5  $\mu$ M of Na<sub>2</sub>MoO<sub>4</sub> 2H<sub>2</sub>O and 0.4 mM of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The specific activity of nitrogenase of Rhizobium cowpea strain 1003 grown on this medium has been found to be about 50 n mol of C<sub>2</sub>H<sub>4</sub> formed per hour per mg of protein. In this medium, mannitol can be replaced by arabinose, glucose or sodium gluconate. Sucrose, however, is not a good carbon source for growth and nitrogenase activity of strain 1003.  
2. Different strains grown on different media exhibit different specific

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 2, Jul [?] 80 pp 1-9]

activities of nitrogenase. The specific activity of nitrogenase of strain 1003 grown on YMA medium (13.7) is much higher than of that grown on CS<sub>7</sub> medium (2.3). However, the specific activity of nitrogenase of strain 32HI grown on YMA is much lower (0.4) than of that grown on CS<sub>7</sub> (36.2).

3. CO<sub>2</sub> was found to exert a significant influence on the activity of nitrogenase. One to three percent CO<sub>2</sub> in the gas phase over the agar medium increased the specific activity of the enzyme to about 1.5 to 2.5 times as much as the case of CO<sub>2</sub>-free control. The effect of CO<sub>2</sub> on nitrogenase activity may be due to the supply of organic carbon substrate (by CO<sub>2</sub> fixation) rather than by the changing of pH. Further investigation on the mechanism of the CO<sub>2</sub> effect on nitrogenase activity of free-living rhizobium is still in progress.

AUTHOR: ZHENG Piya [6774 0012 1031]

ORG: None

TITLE: "Preliminary Observation on Ontogenetic Processes and Several Characteristics Related to Agricultural Practices of Summer Maize Cultivar 'Nongda 54'"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 11-22

TEXT OF ENGLISH ABSTRACT: A systematic observation has been made since 1977 on the biology of summer maize cultivar "Nongda 54." Results obtained during 1977-1978 may be summarized as follows:

1. Under normal conditions, cultivar "Nongda 54" usually develops up to 16 leaves. Its ear comes out from the axil of the 11th leaf. One leaf above the cob and one leaf below it may be termed as "ear nourishing leaves" which are the larger leaves of the plant. Geometrically, smaller leaves are located at the lower and upper parts of the plant, while the larger ones are in the middle.
2. When fertilizer was once given during seeding, top-dressing showed little effect on plant size except on the number of root layers, root number and the length of the internodes. However, top-dressing played an important role in the development of reproductive organs and the functional activities.

3. "Nongda 54" is a variety with both pubescent and glabrous leaves on the same plant. The first five leaves are glabrous and those above the sixth leaf are all pubescent. The sixth leaf is transitional. As the first five leaves are the embryonic leaves enclosed in the coleoptile, it might be termed as "the nourishing leaves at the juvenile stage."

4. In accordance with the functions played by them, the leaves may be divided into three groups, with the 11th leaf as the turning point. The first group (root nourishing leaves) consists of the leaves from the first one to the sixth, the function of which is to nourish the roots. The second group (cob nourishing leaves) consists of the leaves from the 6th to the 11th, which are responsible for supplying the assimilate to the cobs. The third group of leaves (seed nourishing leaves) are those located above the cob, determining the development of the seed.

5. The separate functions of the three groups of leaves had been verified in an experiment while leaf pruning was carefully done. Further investigations are underway.

6. Based on the biology of the cultivar "Nongda 54," recommendations of agro-technique for obtaining high yield are made. It is pointed out that emphasis must be given to appropriate seeding date, timely top-dressing, irrigation and intertilage and soil mulching at the 6th and 11th leaf stage.

AUTHOR: MI Jingjiu [4717 2529 0046]  
CHEN Dexin [7115 1795 9515]  
ZHANG Shouyi [1728 1343 0001]

ORG: None

TITLE: "A Comparative Study of the Flowering Characteristics of Wheat, Rye and Triticale"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 23-30

TEXT OF ENGLISH ABSTRACT: 1. The duration between heading and flowering is 3-4 days for wheat, 9-12 days for rye and 6-7 days for triticale respectively.  
2. The duration of the flowering of the whole spike is three to four days for wheat, four to five days for rye and three to six days for triticale respectively.  
3. The most concentrated flowering period for wheat and rye is on the second day of flowering, totaling over a half for wheat, 40 percent for rye, while that for triticale is on the second to fourth day.  
4. The average duration for the opening of glumes per floret is half an hour for wheat, one hour for rye and one hour for triticale.  
5. Wheat and triticale may flower both at day and night, but rye does not flower

at night.

6. The flowering of wheat, rye and triticale generally has two peaks around the clock; the first one is comparatively clear, usually from 8 to 10 am, while the second is less prominent, usually from 1600 to 1800 hours. Different varieties have different flowering peaks, their advance or delay, concentration or scattering being closely connected with temperature and humidity.

7. The mode of flowering of wheat varieties observed belongs to the open-type, and its sequence of flowering initiates from the first floret situated at the mid-upper spikelet, making a circle. The flowering of rye is of the open-type, its spikelets being in the mid-spike flower in tandem. The flowering of triticale is also of the open-type. At first its sequence of flowering follows the type of rye, then shifts to that of wheat.

8. A phenomenon known as "repeated flowering" was noted in triticale. All unfertilized florets possessing male sterility generally reopen for the second time following the normal flowering, with a duration of from one to eight days. If they are pollinated within five days during the repeated flowering, there is still a certain percentage of seed setting.

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ORG: None

TITLE: "Studies on the Characteristics of the Growth and Development in the Seedling Stage of Peanuts (Arachis hypogaea L.)"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTRAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 31-42

TEXT OF ENGLISH ABSTRACT: The characteristics of the growth and development of the peanut in the seedling stage were studied so as to throw light upon the relationship between these characteristics and those in the flowering and fruiting stages. The experiment was carried out with two varieties, namely Beijing-Dahuasheng peanut (common type, semi-erect, large-seeded) and Shandong-Fuhuasheng peanut (pearl-bean type, erect). The results obtained were as follows:

With the Beijing-Dahuasheng peanut, after the third leaf of the main stem expanded, the differentiation of the sepals of the flower-bud began. But with the Shandong-Fuhuasheng peanut this had already happened during the process from germination to emergence. At the beginning of the flowering stage, the number of leaves extended on the main stem was eight on the Beijing-Dahuasheng peanut, whereas on the Shandong-Fuhuasheng peanut it was only seven. Several

[Continuation of BEIJING NONGYE DAXUE XUEBAO No 2, Jul [?] 80 pp 31-42]

plantings were made in Beijing from 28 April to 1 September. The daily mean temperatures during this period were from 17.5°C to 25.9°C, and the day lengths were from 11 hours 21 minutes to 15 hours 1 minute. The above-mentioned behavior, however, remained unaltered with the changes of environmental conditions, such as temperature or day length. At the beginning of the flowering stage, the number of leaves extended was eight on the main stem, five on primary lateral branches, six on the secondary lateral branches, three on the tertiary lateral branches, and one on the quaternary lateral branches of the Beijing-Dahuasheng peanut, and the numbers were seven, four, two and two respectively in the absence of the quaternary lateral branches on the Shandong-Fuhuasheng peanut. This remained unaltered in spite of the changes of conditions.

At the beginning of the flowering stage, an average of 150 flower buds per plant on the Shandong-Fuhuasheng peanut and an average of 45 flower buds per plant on the Beijing-Dahuasheng peanut were observed. The total number of flowers was about 160 per plant. Thus, about 93.8 percent of the total number of flowers on the Shandong-Fuhuasheng peanut appeared before the beginning of the flowering stage, whereas only 28.1 percent appeared on the Beijing-Dahuasheng peanut.

The results obtained can be used as the basis for further research on the relationships between the growth and development in the seedling stage and those

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in the flowering stage, as well as on their influence on the yield. They can also be used as references for the cultural practices of seedlings.

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ORG: None

TITLE: "A Preliminary Evaluation of Climatic Regions for Grape Production in North China"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTRAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 43-51

TEXT OF ENGLISH ABSTRACT: The evaluation of climatic regions suitable for grape production is essential for China, especially during this present increase in the grape and wine industry. The author has attempted this work on the basis of experience and research in China and abroad. Climatic regions for grapes can be classified into five types according to the local effective heat-unit summations. Each locality has been evaluated with reference to its total annual precipitation, average temperature in its warmest month, water-heat coefficients in the ripening season, and other features. A -14°C (mean of the absolute minimum temperatures experienced over a period of many years) isotherm is shown, representing the marginal boundary for vineyards existing without winter protection.

In light of the preliminary evaluation, table wine grape production would be

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suitable in the cool summer regions, and possibly in some areas in the moderately warm regions if the water-heat coefficients are low. For quality dessert wine grape production, there are fewer possibilities other than the southern parts of Xinjiang. Areas that are ideal for growing quality table wine grapes are unfortunately located where grapevines should be buried during the winter period. This problem could be partially overcome by breeding cold-hardy cultivars and improving some of the regular cultural techniques in practice at present.

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ORG: None

TITLE: "Chemical Thinning on 'Yali' Pear"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul (?) 80 pp 53-59

TEXT OF ENGLISH ABSTRACT: This paper summarizes a four-year thinning trial conducted in the central part of Hebei Province on the effectiveness of NAA and Sevin on pear cultivar "Yali" (Tianjin Pear). NAA spray at 40 ppm applied at full bloom produced satisfactory thinning effects, causing a marked reduction in fruit set. NAA spray with supplemental hand-thinning to a proper degree achieved a good yield of high fruit quality as well as sufficient flower formation which ensured the next year's crop. Preliminary trials with Sevin sprays at the rates of 1000 or 1500 ppm applied at full bloom in 1977 also resulted in fairly satisfactory thinning effects, although the degree of thinning was less than that of NAA (40 ppm).

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ORG: None

TITLE: "The Heredity of Induced Mutation in Barley (Hordeum vulgare L.)"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul (?) 80 pp 77-85

TEXT OF ENGLISH ABSTRACT: The results of our research on induced mutation in the past few years were summarized in this report. Barley seeds of three cultivars, namely Hedist, Early-maturity 3 and "nameless," were treated with  $^{60}\text{Co}$   $\gamma$ -ray, fast neutrons, thermal neutrons and sodium azide. As a result of these treatments, 18 types of mutants in 8 characteristics (awn length, plant height, spike types, spike with chlorophyll deficiency, waxiness, date of heading, sterility and naked grain, etc.) were obtained, most of which were single gene recessive mutants, but a few of which were semidominant ones. It was also indicated by our study that different mutation spectra occurred in different genetic backgrounds; a deficiency of recessive mutants exists commonly, but this

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phenomenon in lethal mutation is more marked than in surviving ones. The means through which to overcome the pleiotropy of the mutated genes were also discussed.

AUTHOR: WANG Hongkang [3769 1347 1660]

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TITLE: "Utilization of Sludge in Agriculture"

SOURCE: Beijing BEIJING NONGYE DAXUE XUEBAO [ACTA AGRICULTURAE UNIVERSITATIS PEKINENSIS] in Chinese No 2, Jul [?] 80 pp 87-96

TEXT OF ENGLISH ABSTRACT: This is a review concerning the utilization of sludge in agriculture. The nutrient content and harmful factors of sludge are discussed. In the article great attention has been paid to the changes and movements of the heavy metals in the soil, the plant response after the application of the sludge, the safe limits and guidelines for the use of sludge on land.

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Meteorology

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TITLE: "The Spiral Structure of the Tropical Cyclone"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3,  
Sep 80 pp 193-204

TEXT OF ENGLISH ABSTRACT: In this paper, starting from the equations describing the tropical cyclone, the spiral structure of the tropical cyclone is discussed and the flow pattern is described. It shows that the formation of the spiral structure is due to the action of internal gravity-inertia waves, particularly internal gravity waves. The spiral form is connected with the phase velocity of waves. The "trailing" spiral structure in the northern hemisphere demands that the spiral lines move counterclockwise and outward. The angle with which a spiral line intersects a circle of radius  $r$  is ordinarily less than  $45^\circ$ , and at the edge of the tropical cyclone it is about  $10^\circ$ . The distance between the spiral "arms" is about 220 km for  $m = 2$ , 110 km for  $m = 4$ . The spiral waves of

[Continuation of QIXIANG XUEBAO No 3, Sep 80 pp 193-204]

the tropical cyclone are dispersive. In the "trailing" spiral,  $c_{gr}$  and  $c_r$  are always positive, and  $c_{gr} < c_r$ . It is found that, if the water vapor is enough and latent heat is more than enough, the tropical cyclone may survive.

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TITLE: "The Modeling Experiment about the Zonal-Asymmetrical Heating Effects on the General Circulation of the Atmosphere"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 205-218

TEXT OF ENGLISH ABSTRACT: The heating effects on the general circulation are modeled in a steady rotating dishpan. Characteristics of the flow patterns in the experiments have been investigated and it has been found out that the flow waves  $n = 1, 2$  are distinctly controlled by the heat sources. It is evident that the heating effects on the formation of the mean troughs and ridges are modeled in the laboratory experiments. It has also been found that the heat sources may result in transformation of the wave patterns.

AUTHOR: ZHANG Jiacheng [1728 1367 6134]

ORG: Academy of Meteorological Science, Central Meteorological Service

TITLE: "The Thermal Effect of Meridional Sea-Land Distribution on the General Atmospheric Circulation in Eurasia and Its Contiguous Areas"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 219-226

TEXT OF ENGLISH ABSTRACT: In this article a simplified scheme on the thermal effect of meridional sea-land distribution to the atmospheric circulation is proposed. Considering the geographical peculiarities of Eurasia and its contiguous areas, this scheme may be used for explaining the formation of the South Asian jet stream in winter, the South Asian Anticyclone on 100 mb surface in summer, and also the seasonal variation of general atmospheric circulation in the above-mentioned area.

AUTHOR: CHEN Yuqiong [7115 3768 8825]  
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TITLE: "A Preliminary Study of the Relations between the Coefficients of Chebyshev and Temperature and Rainfall in China"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 227-233

TEXT OF ENGLISH ABSTRACT: In this article the 500 mb height of each pentad in the period 1954-1975 in the area  $15-65^{\circ}\text{N}$ ,  $75-155^{\circ}\text{E}$ , are resolved with Chebyshev Polynomials. Some main coefficients are obtained, and the physical explanation of these coefficients as well as the relationships of these coefficients with temperature and rainfall in China are discussed. The main results are as follows:

1. The coefficients  $A_{10}$ ,  $A_{01}$ , which express the meridional and zonal circulation of the atmosphere are correlated with the 10-year running means of temperature grade and monthly average temperature of all parts of China. This correlation makes it possible to forecast the tendency of temperature.

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2. A multicorrelation table, formed by the December coefficient  $A_{00}$  which expresses average height and the January coefficient  $A_{10}$  in the same winter, is a possible tool for forecasting the tendency of rainfall in the coming rainy season (May-August) of the middle and lower reaches of the Changjiang. Good results have been obtained in three-year applications.

AUTHOR: DING Shisheng [0002 1102 8508]

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TITLE: "The Climatic Analysis of Low Temperature in Summer over Northeast China and Influence on the Agricultural Products"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 234-242

TEXT OF ENGLISH ABSTRACT: In this paper, the summer temperature over northeast China, 1881-1978, has been examined by climatic analysis. It has been determined that the heavy low temperature in summer over northeast China is a kind of very large-scale phenomenon for space and time. The sum of monthly mean temperatures for May-September in Changchun may well represent the cold and warm summers over the northeast China districts. The summer temperature over northeast China has obvious stages, a 110-year-long period and a 3-year period. If the summer temperature over northeast China is low, heavy damage to the agricultural products will happen. During years of cold weather damage, the heaviest damage is done to growing rice, while sorghum is the next damaged crop.

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ORG: All of the Shanghai Meteorological Bureau

TITLE: "Seasonal Forecast of Spring Rainfall at Shanghai"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 234-249

TEXT OF ENGLISH ABSTRACT: Spring rainfall at Shanghai is classified according to the number of total rain days and the characteristic distribution of the rain days. The category of spring rain is found to be well related to the number of days with Ural blocking high in the preceding winter (December-February). Finally, a forecast is made with good results for the category of spring rainfall of 1979.

AUTHOR: ZHOU Mingyu [0719 2494 3558]  
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TITLE: "The Structure of the Boundary Layer after the Passage of a Cold Front"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 250-259

TEXT OF ENGLISH ABSTRACT: The structure of the boundary layer for the process of strong weather after the passage of a cold front is discussed using the data of the acoustic radar, the temperature and wind speed obtained from an 80 meter meteorological tower, and the radiosonde sounding and analyses of the weather maps. It is shown that the formation of strong wind is closely correlated to the subsidence of the upper cold air as well as the process of the boundary layer.

The analytical results indicate that the weather process of the strong wind is probably formed by the interaction of the momentum flux with the heat flux due to the subsidence of the cold air in the boundary layer.

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LI Guichen [2621 2710 1820]

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TITLE: "A Study on the Formation of the Precipitation in Convective Cloud with Cell Structure"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 260-268

TEXT OF ENGLISH ABSTRACT: The formation of precipitation in convective clouds with cell structure is investigated based on the fact that a cloud consists of a great deal of cells in different phases. Considering that the water content and speed of the updraft in the cloud cells are larger than those in their environments, a cloud model in which droplets grow by stochastic coalescence under the condition of simultaneous fluctuation in water content and updraft is designed.

According to the growth of precipitation particles by coalescence in clouds, a relationship between the droplet growth and its displacement in the cloud with cells is obtained, and we have also discussed the size distribution of

[Continuation of QIXIANG XUEBAO No 3, Sep 80 pp 260-268]

precipitation particles after they have passed through the convective cells at random.

We have calculated the formation of rain and hail in different conditions. It can be shown from the spectrum of precipitation obtained when the above behaviors are considered that larger precipitation particles could be produced in shallow clouds in this case as compared with the same situation (i.e., water content and updraft) in which no cells exist. We have also calculated the effect of the various parameters of the cells on the formation of precipitation, and found that the more the fluctuation is, the larger the elements of precipitation will be. The results calculated show that the rainfall and hailfall in the model fit the realistic state.

AUTHOR: MIAO Jinhai [4924 6930 3189]

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TITLE: "Relationship between the Propagation of the Development of Long Wave Instability and Seasonal Changes of the Atmosphere"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 269-276

TEXT OF ENGLISH ABSTRACT: In this paper it is shown that the notable seasonal changes of atmosphere circulation, such as the beginning and end of Mai-yu and the establishment of winter circulation, were achieved with a medium-range process in which there was the propagation of the development of long wave baroclinic instability downstream.

AUTHOR: YIN Hong [1438 1347]  
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TITLE: "The Best Frequency for Remote Sensing of the Temperature of Upper Troposphere by Ground-based Microwave Radiometry"

SOURCE: Beijing QIXIANG XUEBAO [ACTA METEOROLOGICA SINICA] in Chinese No 3, Sep 80 pp 277-280

TEXT OF ENGLISH ABSTRACT: By the measurement of brightness temperatures at various elevation angles, the remote sensing of atmospheric temperature profiles with the ground-based microwave radiometry can be realized. It was shown that for the temperature remote sensing of the upper troposphere (500 mb to 100 mb), a frequency of around 53.1 GHz gives the best results.

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